

# The Chemical Age

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**NOTICES:**—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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## A German Apologia

A FEW days ago an interesting package reached us from Berlin—so insufficiently stamped, it is our painful duty to add, that inspection of its contents could only be obtained by the payment of 8d. excess. On being opened, it was found to contain a pamphlet by Dr. W. A. Dyes, of Berlin, constituting "an appeal to common-sense," and a reply to a series of articles which Mr. J. S. Negru, a member of the editorial staff of *Chemical and Metallurgical Engineering*, recently contributed to that journal on German conditions as he saw them during a six months' tour of Europe. We happened to meet Mr. Negru in New York shortly after his return from Europe. He went there as the representative of one of the most reputable journals and one of the best publishing houses in the United States. His object was to see things as they are, and to tell the American public what he saw. He recounted to us some of the difficulties put in his way. In spite of them he collected a considerable body of facts and published them. It was not to his interest or to that of his journal to write mischievous fiction; the purpose of his visit was to obtain first-hand in-

formation, and if as a Belgian he wrote occasionally with some feeling it is only what might have been expected. But Dr. Dyes resents his description of German conditions, and seeks to discredit it. One might imagine, if we did not recall such judicial reports as those of Lord Bryce's Commission, that Germany had hitherto enjoyed a spotless record, and was entitled to have its word accepted against all other witnesses. If Mr. Negru discovered another side he is by no means alone, and we know no reason for supposing that he visited Germany for any other purpose than to discover and make known the truth.

With the immense detail of this 27-page pamphlet we have not space to deal. It is mainly interesting as another sample of the strange psychology of the Teutonic mind. During the war we were privileged to see some confidential German documents containing instructions to their information agents in this and other countries. They were a revelation of German mental ingenuity. And we have something of the same quality here. Out of his well-stocked pigeon-holes, Dr. Dyes seems able to produce every favourable reference to Germany uttered since the Flood, and with pathetic belief in their efficacy he employs them to display his country arrayed in white robes. It is the attitude of a highly sensitive man, wounded in his conscience by being thought ill of, and indignant at the slightest aspersion on his honour. To Dr. Dyes it really seems impossible to understand any feelings save those of respect and confidence towards his country. As representing those who have no desire to see Germany "go under," may we offer him a few words of friendly advice? Throughout the war every device which Germany adopted, whether to inspire terror or to elicit sympathy, almost invariably produced the opposite effect. And Dr. Dyes exhibits just the same lack of imagination now—an immense and most ingenious capacity for seeing things in detail and total blindness to broad moral values and effects. If Germany wishes to re-establish herself among the nations, it will not be by meticulous reasoning of this sort. It will be by frankly disowning her recent past, admitting the injustice inflicted on others, and making good the damage. France won the respect of the world by the splendid spirit in which she discharged the crushing penalties Germany imposed on her. The profound respect which Great Britain commands in the United States to-day is due to the quiet and dignified way in which we, the most heavily taxed nation of all, face our obligations. If Germany desires to regain the world's respect, it can be done in the same way, but not by weaving ingenious webs of excuses or reciting long rolls of synthetic virtues or affecting the unsuitable role of the innocent and injured party. A little sackcloth and ashes would be far more becoming as well as more convincing.

### The Case of the Young Chemist

FEW things have given us more satisfaction than occasionally to be able to find an opening for a young chemist vainly in search of a starting point. It is a compliment to be asked for such advice and assistance; it is a pleasure to be able to give it. Through the kindness of firms who are not too big to help in such matters, we have lately been able to "place" one or two applicants, and from frequent communications it is clear that many more are seeking suitable posts. We are by no means alone in the desire to furnish the kind of help needed. The Institute of Chemistry has a constant care for the future of those who pass its courses. In another way, the Chemical Industry Club does what it can to let firms know of applicants, and applicants know of appropriate vacancies. It is, however, certain that organised effort on behalf of young chemists, who have completed their academical qualifications and are anxious to make a start in life, is rather limited. Just now, when many men have lost appointments through reduction of staffs, and are hoping for reinstatement with the improvement of trade, now happily taking place, the difficulty of those seeking for a first appointment is more serious than usual. There must be numbers about to leave or already having left college who look in vain for any immediate employment. We are constantly reminded that one of the essential guarantees of our future industrial and commercial prosperity is a national school of competent chemists and provision for an adequate succession. Yet the young chemists, who have spent years on professional preparation, greatly, we fear, outnumber the existing appointments, and no generally organised attempt is being made to deal with the difficulty.

It has been suggested in these columns before that British industry is capable of profitably absorbing a much larger proportion of chemists than it now employs, and no convincing evidence has been produced in support of the opposite view. But industry on this subject requires to be educated. Too many of its leaders still regard a chemical staff more as a luxury than as a necessity. They want to know beforehand exactly what the results will be, and as no one can foresee how much or how little chemical research may produce, the expenditure seems too speculative. We wish some of the richer organisations, occasionally engaged, we fear, in spending their money for that which is not bread, would turn their minds seriously to this problem of teaching industry some of the ways in which chemistry might profitably serve it. Meanwhile, every man of influence who makes the relation of chemistry to industry better known to the public is doing something to help. In this issue we quote from articles contributed to well-known provincial daily journals, circulating in the densest industrial areas in Great Britain, by Sir E. A. Brotherton, Sir Max Muspratt, and Sir William Alexander. Far from desiring to restrict such writing to the scientific and trade Press, we welcome it as tending to enhance the repute of chemistry among commercial men. The more the country knows about the subject, the more it becomes interested in it, the better it will be for chemical manufacturers, chemical merchants and professional chemists. And the less the country knows

the worse for all three. By degrees, we hope, it may yet come to be generally recognised that the influences which made for a wider distribution of knowledge are entirely good, and that those which seek to restrict it are among the enemies of progress.

### A High Witness to Advertising

It is announced that the well-known business of Day and Martin is to be sold. The reason assigned by Mr. Burlison, the managing director, is worth the attention of all heads of businesses. "Up till 1894," he says, "Day and Martin had the world at their feet through advertising. From that time they omitted to keep telling the public about their goods, with the result that they are in the market. You have to advertise and go on and on and on." This is by no means the only case in which the mistake of relying too much on an established reputation has been realised after the mischief has been done. Advertising has this subtle quality about it—you can never tell precisely what untraceable advantages are produced by it, nor what untraceable losses may arise from its neglect. In either case the effects are cumulative and do not show immediately. It is here that the shorter sighted class of people so often make their mistake. If business is not going strongly they are apt to turn to the advertising allotment as the one that can most easily be cut, with the inevitable effect that the chances of pulling up are diminished instead of being increased. If they are doing particularly well, some smart financier says, "Let's save this expenditure on advertising now that we have as much business as we want." And then the inevitable happens—business gradually drifts away from the firm in the background to the firms that are constantly before the trade. Once lost the position is very difficult to regain, and often the loss is not discovered until it is too late to be made good. It is economy, therefore, as every authority on the psychology of publicity will tell one, to make sure of keeping the machine running well, instead of risking a stoppage.

### Foreign Trade in Chemicals

AN inspection of the figures relating to our overseas trade in 1922 reveals a decline in imports of £81,581,000 and an increase of £17,096,000 in exports of British produce and manufactures, as compared with 1921. With exports lower by £3,141,000, the year's adverse balance of trade stands at the relatively modest figure of £179,643, as against £276,438,000 in 1921, and of £378,766,000 in the preceding year.

This improvement is reflected in the statistics which are of immediate concern to the chemical industry, for while the year's imports of chemicals, drugs, dyes and colours were valued at £1,246,087 less than the 1921 imports, exports were £1,242,612, and re-exports, £99,621 more. The dyestuffs position, viewed independently, is not quite so good, for although the year's imports of finished coal tar dyestuffs show a decrease of £267,115, and those of natural indiangos an increase of £31,307, the value of all kinds of dyestuffs exported only amounted to £710,703, as compared with £1,552,898, the total for 1921. This diminution in value, of £842,195, is accompanied by a quantity total

29,787 cwt. less than that of the previous year. In 1920, 295,471 cwt. of dyestuffs were exported, the total in the two succeeding years dropping first to 130,144 cwt., and then to 100,357.

With a total value of £2,396,511 exports of sulphate of ammonia weighed 145,292 tons, so that in comparison with 1921 there is an increased tonnage of 16,799, and a value total less by £263,411. A further illustration of the progressively increasing shipments and of the similarly progressive fall in prices during the last three years is furnished by the 1920 export figures, according to which 109,620 tons of the value of £3,658,625, were exported; in 1921 and 1922 the totals were respectively 128,493 tons, worth £2,659,922, and 145,292 tons of the recorded value of £2,396,511.

### Dyestuffs Committees

IN consequence of the pressure of other professional and public duties Mr. E. V. Evans has resigned his seat on both the Dyestuffs Advisory Licensing Committee and the Dyestuffs Industry Development Committee. Mr. Evans, we believe, has sat on each body since its establishment, and while the loss of his services is to be regretted, some compensation may be found in the prospect of an earlier completion than would otherwise be the case of an important text book on which Mr. Evans has been for some time engaged. To fill the vacancy on the Licensing Committee, Mr. W. H. Dawson, the manager of the British Alizarine Co., of Trafford Park, Manchester, has been appointed by the Board of Trade on the nomination of the Association of British Chemical Manufacturers. The vacancy on the Development Committee has been filled by the appointment of Mr. Lionel Blundell, of the North British Chemical Co., Ltd., of Droydsden, Manchester. Mr. Dawson's knowledge of the dyestuffs industry as the head of a firm which kept British users supplied with vital colours when foreign sources dried up should be of value to a committee which requires all the first-hand knowledge of the trade which is available. Mr. Blundell belongs to the younger school of chemical manufacturers, and on the development side of the dyestuffs industry practical business men of his type will find ample scope for all their energy and enterprise.

### British Chemicals

THE new edition for 1923 of the official Directory of Members of the Association of British Chemical Manufacturers, with a classified list of their manufactures (166, Piccadilly, London, pp. 319, 10s. 6d.), is a welcome addition to the commercial man's reference library, and incidentally an indication of the remarkable constructive organisation which the Association has built up within the past few years. In the latter respect its record among chemical enterprises has no parallel so far as one can recall. The new edition contains a list of some 150 British chemical manufacturers, with a classified table of the products which they manufacture, and a section devoted to proprietary and trade names. The new list of products comprises considerably more detail than that in the previous edition, and as it is published in French, German, Italian, Spanish and Portuguese, as well as English, it should be extremely useful to overseas buyers. The

object of the publication is to facilitate business relations between manufacturers and chemical firms and purchasers all over the world, and the Association, we are authorised to say, welcome inquiries with regard to any particular product. Copies of the Directory may be purchased at 10s. 6d. from the offices at 166, Piccadilly, London, W.1.

### Points from our News Pages

- The dust hazard in industry is discussed in the first of two articles written by Dr. W. E. Gibbs for THE CHEMICAL AGE (p. 54).
- A plan is given of the stands together with a complete list of exhibitors at the Chemical Section of the forthcoming British Industries Fair (p. 56).
- The death is announced of Mr. F. E. Weston, head of the Chemistry Department at the Polytechnic, Regent Street, London (p. 57).
- British chemical leaders give their views on trade conditions and prospects (p. 58).
- Recommendations of the Institutes of Chemistry and of Physics with regard to the qualifications of gas examiners were put before the committee which is investigating the thermal system of charging for gas (p. 60).
- Although last year's chemical exports show improvement, an appreciable decline is recorded in the returns for the month of December (p. 62).
- According to our London Market Report there has been a marked increase in activity and prices are tending upwards (p. 70).
- Our Scottish Market Report states that business has been fairly satisfactory with a good proportion of export inquiries (p. 73).

### The Calendar

Jan.		
22	University of Birmingham Chemical Society: Address by Professor G. T. Morgan.	Birmingham.
22	The Institute of Chemistry (Manchester Section): General Meeting. 7 p.m.	Grand Hotel, Manchester.
23	Northern Polytechnic Institute Chemical Association: "The Manufacture of Organic Chemicals: How such Processes are Established": F. H. Carr. 8 p.m.	Holloway, London, N.
23	Royal Institution of Great Britain: Professor F. G. Donnan. 3 p.m.	Albemarle Street, London, W.1.
23	Society of Chemical Industry (Birmingham Section): "Fuel Symposium." 7 p.m.	University Bldgs., Edmund Street, Birmingham.
24	Royal Society of Arts: "The New Methods of Crystal Analysis, and their Bearing on Pure and Applied Science": Sir William Henry Bragg. 8 p.m.	John Street, Adelphi, London.
24	Institute of Chemistry (Huddersfield Section): "Plant Pigments": Dr. A. E. Everest.	Huddersfield.
25	Royal Society: Papers by Professor A. V. Hill, Dr. E. F. Armstrong and others.	Burlington House, London, W.1.
	The Optical Society. 7.30 p.m.	Imperial College, South Kensington.
27	The West Yorkshire Metallurgical Society: Symposium of papers on Casting of Metals.	City Museum, Leeds.
30	Hull Chemical and Engineering Society: C. H. Hardy. 7.30 p.m.	Hull Photographic Society's Rooms, Park Street, Hull.



# The Problem of Dust Explosions in Industry—I.

By W. E. Gibbs, D.Sc.

*The author, who is the chief chemist to the Salt Union, Ltd., and the author of "Disperse Systems in Gases" and papers on "The Industrial Treatment of Fumes and Dusty Gases," discusses comprehensively what is described as the dust hazard in industry and methods of providing against it. The second instalment of the article will appear next week.*

## The Dust Hazard in Industry

MILLING and grinding operations in industry are necessarily dusty processes. In cement works, flour mills, starch and sugar factories, saw mills, threshing machines, textile factories, metal grinding and buffing shops, etc., fine dust is continually being produced. It escapes from the mill or disintegrator, even when the machine is of the enclosed type, and floats in the air and gradually settles on rafters, windows, walls, floors and machinery, and upon the workers themselves.

Fine dust is also formed in coal and metal mining operations, partly as a direct result of drilling and firing and partly because of the traffic along the workings.

What is described in America as the "dust hazard" in industry can be conveniently divided into a physiological hazard and an explosion hazard. The physiological hazard arises from the physiological effect of different dusts upon the health of the workers. Some dusts—for example, the arsenical dust formed when certain kinds of insecticide are being packed—are directly poisonous. The dust that is produced when certain alkaloid-containing barks are disintegrated is extremely irritating to the eyes, nose and throat of the workers and causes considerable distress. The fine spicular dust from quartz and other rocks, that is formed in gold and other metal mines, may make it physically impossible for the workers to work at more than one-third of their normal capacity, and may, in a very short period—frequently less than five years—completely incapacitate them for work by causing chronic bronchitis, miners' asthma or miners' phthisis.

A great deal has been done in this country by the Home Office and the Ministry of Health, and in America by the Bureau of Mines and the Public Health Service, to minimise this form of dust hazard, either by the removal of the dust at the point of formation or, where possible, by keeping the work damp and so preventing the formation of dry dust, or, where these methods are impracticable, by introducing the use of gas masks by the workers.

In addition to the direct physiological effect of dust upon the health of workers, there lurks the more dramatic danger of the dust explosion. Dusts that are formed by the disintegration of inflammable substances—for example, coal, cereals, starch, sulphur, wood, fertilisers, feeding stuffs, textiles—are not only inflammable but, owing to their enormously increased specific surface, may, under suitable conditions of concentration and atmospheric humidity, catch fire and burn with explosive violence.

## Coal Dust Explosions

A considerable amount of work has been done in this country, and also abroad, on the causes and mechanism of dust explosions in coal mines. In this country, during the last twelve years, the subject has been investigated experimentally at Altofts, in Yorkshire, by the Mine Owners' Association, and at Eskmeals, in Cumberland, by a committee of experts appointed in 1911 by the Home Secretary. Valuable work has been carried out at Liévin, in France, under the direction of a committee appointed by the French Government. In 1907 the Technological Branch of the United States Geological Survey commenced the investigation of explosions in coal mines. An experimental station was established at Pittsburgh. In 1910 this division became a separate bureau, the United States Bureau of Mines.

As a result of these investigations it has been shown that:—

(a) 0.2 oz. coal dust per cub. ft. of air (1 lb. of dust per linear foot of an ordinary mine gangway) will propagate an explosion.

(b) Blasting a single hole, using a long flame explosive (black powder or dynamite), may cause the ignition of the dust cloud.

(c) Dust-laden air will explode, whether it be quiescent or moving to or from the source of ignition.

(d) The air may be saturated with moisture, but the dust will explode, provided enough dust be present.

It was found that the propagation of an explosion could be effectively arrested by the introduction of rock dust barriers which are tripped mechanically by the advancing force wave, and discharge from three to four tons of stone dust in a dense cloud in front of the advancing explosion wave. This dust dilutes the coal dust in the air of the gangway, and prevents the propagation of the explosion.

## Factory Dust

In 1911 a disastrous explosion occurred in a Liverpool oil-cake mill, by which thirty-nine people were killed and one hundred and one were injured (*J.S.C.I.*, vol. 31, p. 599). This was the first serious dust explosion to occur in a factory in this country, and served to draw public attention to this danger.

Dr. R. V. Wheeler, of the Explosion in Coal Mines Committee of the Home Office, conducted a valuable series of experiments on sixty-six different samples of dust, collected from factories and Workshops Acts. Wheeler investigated (a) the relative temperatures at which the various dusts could be ignited freely, thus discriminating between harmless and dangerous dusts; and (b) the lowest temperature at which ignition could be effected, from which the possibility of ignition by such common causes as electric sparks, a match flame, heated metal, etc., could be inferred. The relative temperature of free ignition was determined by passing the dust over a platinum wire, heated electrically, and observing the temperature at which combustion occurred. The lowest temperature at which ignition could occur was determined by passing the dust through a small electrically heated porcelain tube containing a copper spiral, and observing the lowest temperature at which ignition of the dust occurred.

As a result of these tests, Wheeler arranged the various dusts in three classes, as follows:—

Dust.	CLASS I.	
	(a) Relative Temp. of Ignition. Deg. C.	(b) Lowest Ignition Temperature. Deg. C.
Sugar .....	805	540
Dextrine .....	940	540
Starch .....	1,035	640
Cocoa .....	970	620
Rice, meal and cake refuse.....	970	630
Cork .....	1,000	630
Soya Bean (unextracted) .....	975	630
Wood Flour .....	985	610
Malt .....	990	600
Oat Husk .....	990	620
Grain (flour mill) .....	995	630
Maize .....	1,010	645
Tea .....	1,010	640
Compound Cake .....	955	620
Grain (storage) .....	1,050	630
Rape Seed .....	1,050	650
Cornflour .....	1,060	620
Flour (flour mill) .....	1,060	650
Chicory .....	1,070	660
Briquette.....	1,090	800
Gramophone Record .....	1,100	750
Soya Bean (extracted) .....	1,140	630

These dusts ignite and propagate flame readily. The source of heat required for ignition is comparatively small—for example, a match flame. The dusts are arranged roughly in the order of their inflammability; the most dangerous are sugar, dextrine, starch and cocoa—particularly sugar. Sugar ignites when projected as a cloud against a surface heated to below red heat, and when ignition has taken place, the flame travels through the dust cloud with great rapidity.



## CLASS II.

Dust.	(a) Relative Temp. of Ignition. Deg. C.	(b) Lowest Ignition Temperature. Deg. C.
Copal Gum .....	1,010	750
Leather .....	1,050	740
"Dead" Cork .....	1,100	740
Coconut Oil milling .....	—	640
Rice milling .....	—	630
Sawdust .....	970	635
Castor Oil meal .....	1,100	655
Oil Cake .....	945	660
Offal grinding (bran) .....	980	640
Grist milling .....	—	600
Horn Meal .....	—	670
Mustard .....	1,050	680
Shoddy .....	—	690
Shellac composition .....	—	780

These dusts are readily ignited, but for the propagation of flame, they require a source of heat, either of large size and high temperature, *e.g.*, an electric arc, or of long duration, *e.g.*, a Bunsen burner.

## CLASS III.

Dust.	(a) Relative Temp. of Ignition. Deg. C.	(b) Lowest Ignition Temperature. Deg. C.
Organic Ammonia .....	—	690
Tobacco .....	—	680
Spice milling .....	—	680
Bone Meal .....	—	700
Coal (foundry blacking) .....	—	830
Lamp black .....	—	—
Sack cleaning .....	—	—
Retort Carbon .....	—	—
Rape Seed (Russian) .....	—	640
Blacking .....	—	—
Drug grinding .....	—	690
Cotton Seed .....	—	—
Charcoal .....	—	760
Foundry Blacking .....	—	810
Brush Carbon .....	—	—
Stale Coke .....	—	—
Plumbago .....	—	—
Bone Charcoal .....	—	—
Mineral and Ivory Black .....	—	—

These dusts do not appear to be capable of propagating flame under ordinary factory conditions, either (a) because they do not readily form a cloud in air; or (b) because they contain a large quantity of incombustible matter; or (c) because the material of which they are composed does not burn rapidly enough. Of these dusts, the first ten are all inflammable, but the samples tested were not capable of propagating flame. It is possible, however, that other samples of the same materials, containing less incombustible matter, or in a finer state of division, might be capable of propagating flame.

In 1913 the U.S. Bureau of Mines investigated an extensive explosion that occurred in a feed grinding plant at Buffalo, and, since then, has carried out numerous investigations on dust explosions in mills, elevators and factories. The results of these investigations have been published in a large number of reports and papers in the American technical press during the last fifteen years. Recently, this information has been collected and published in book form by Messrs. David J. Price and Harold H. Brown, respectively Engineer and Chemist in charge of the dust explosions investigations. The present article is based largely upon the experimental results that have been published by the Bureau of Mines.

## Explosive Combustion

When any substance burns in air, the rate of combustion depends, *ceteris paribus*, upon the surface area that is freely exposed by the substance to the air. There is no comparison, for example, between the rate of combustion of a block of wood and of the same weight of wood shavings. An equal weight of sawdust would burn even more rapidly, provided that all the particles had free access to the air throughout the combustion process, and at the same time were near enough to one another to communicate ignition to each other.

The maximum possible surface of contact between a com-

bustible and air is attained when a combustible gas is mixed with air. In such a mixture, provided that the gas and air are mixed in suitable proportions—approximately their combining proportions—combustion spreads through the mass with such velocity as to cause an explosion. The combustion of such a gas-air mixture takes place in at least two stages, ignition and propagation. To ignite the mixture, it is necessary to raise its temperature sufficiently at some point for combustion to take place. The heat produced by this combustion, except for any that is lost by radiation and conduction, will raise the temperature of the adjacent layer of unburnt gas. If the amount of heat be sufficient to raise the temperature of this unburnt gas to the ignition point, the gas will burn, and, in its turn, will ignite the next layer of unburnt gas. In this way, a wave of ignition will spread through the gas, to be followed by a wave of combustion, *i.e.*, a flame. In a suitable gas mixture, the flame velocity will easily exceed 2,000 ft. per second. Where combustion occurs, the gas in the immediate locality will be suddenly expanded, owing to the rise of temperature, so that a wave of pressure, travelling with the velocity of sound, will overtake the wave of combustion. The effect of the compression wave under certain conditions is to compress the gas immediately in front of it, and so raise its temperature. If the amount of this compression is sufficient to raise the temperature to the ignition point, combustion occurs with very much greater velocity and violence, producing detonation.

Anything which lowers the rate of combustion of the gas—for example, a reduction of pressure or dilution with an inert gas, or anything which may absorb any of the heat of combustion—for instance, inert gases, water vapour, inert dust or an excess of either reacting gas—will diminish the heating effect of the primary ignition and may make it impossible to raise the temperature of the adjacent unburnt gas to the ignition point—*i.e.*, to propagate combustion.

To obtain explosive combustion of a gas mixture, therefore, it is necessary to have (a) a sufficient proportion of inflammable gas, and (b) an adequate means of ignition. The most explosive mixture is that which consists of the pure gas and oxygen, in their combining proportions. The mixture becomes less explosive as the proportion of either constituent is increased until beyond an upper and lower limit of concentration of the inflammable gas, the mixture ceases to be explosively inflammable. The propagation of combustion through the gas mixture can be arrested also by diluting the gas with an inert gas, or with inert dust, with liquid water—*e.g.*, fog—or by surrounding the source of ignition with a mass of metal able to absorb the heat of combustion sufficiently to prevent the spread of ignition, as in the Davy safety lamp.

In a mixture of gas and air, the molecules of each constituent are not only intimately mixed, but are in rapid and ceaseless thermo-dynamic motion, each molecule colliding with its neighbours many thousand million times per second. This intimate dynamic contact probably plays an important part in facilitating the propagation of ignition through the gas mixture.

## Dust Explosions

The particles of a dust cloud, although many million times larger than molecules, are yet very small. Dust particles that float in the air for any length of time cannot be much larger than 0.01 cm. diameter. Such particles, however, are too large to respond to molecular bombardment by the air at ordinary pressures—that is, they do not exhibit Brownian motion; they simply drift in the air, in response to convection currents and draughts. In most dust clouds there is a proportion of finer dust particles that are in active Brownian motion—that is, they are less than 0.0001 cm. in diameter. It is reasonable to expect that these particles would facilitate the propagation of ignition and so help to promote explosive combustion.

A dust-air mixture, therefore, differs essentially from a gas-air mixture in the degree of intimacy of contact between the two constituents, regarded both statically and dynamically. The specific surface of the dust, however, is still enormous when compared with the same substance in massive form and, under suitable conditions of concentration, it can, when ignited, burn with explosive violence. One hundred grams of starch dust, distributed in a cubic metre of air, constitutes a very explosive mixture. If we assume the dust particles to be

spherical, and of an average diameter of  $\cdot 001$  cm., there will be about 100,000 particles per cub. cm. of air. The particles will be about  $\cdot 02$  cm. apart, and the total surface area of 100 gms. of dust will exceed 30 sq. metres. A small proportion of finer dust particles of, say,  $\cdot 00001$  cm. diameter, would effectively occupy the intervening spaces and, by their ceaseless agitation, would form a connecting link between the coarser particles. In much the same way a small amount of inflammable gas would serve to communicate ignition from one particle to another.

In such a system the possibility of ignition would be determined in the first place by the ease of oxidation of the particles themselves; this is indicated by the relative temperature at which the dust particles ignite.

The propagation of ignition through the dust cloud will be determined by the quantity and intensity of the heat given out by the ignited particles, after allowing for loss by radiation and by the absorption of heat by inert gas or inert dust—i.e., it will be determined by the rate of combustion of the inflammable dust and the specific heat and thermal conductivity of the dust cloud. The rate of combustion of each individual particle clearly depends upon the area of contact between it and the oxygen; the smaller the particle the larger will be its specific surface and the more rapidly will it burn. Also, the higher the partial pressure of oxygen the more

rapidly will combustion proceed. Some of the heat of combustion may be absorbed by liquid water on the dust particles, or, to a less extent, by water vapour in the gas, by inert gas or by inert dust. The presence of incombustible matter—ash—in the combustible dust itself will retard the combustion of the combustible part of the dust by diluting it and will also absorb some of the heat of combustion. Heat may also be lost by radiation from the incandescent particles, whether combustible or incombustible. The amount of heat lost by radiation in this way will depend upon the surface area of the particles and upon the radiating efficiency of the substances of which they consist. The loss by radiation from a dust cloud will be much greater than from a gas.

If the heat of combustion is generated at a sufficient rate, so that, after all losses by absorption and radiation have been incurred, it is still sufficient to raise the temperature of the adjacent unburnt gas to the ignition point, combustion will spread. The velocity of propagation will depend upon the distance between the particles; it is necessarily lower in a dust cloud than in a gas mixture, for (a) the dust particles take longer to ignite and to burn, than the gas molecules, and (b) they are further apart, and not undergoing frequent collision. The velocity of propagation can conceivably be accelerated by the presence of (a) inflammable gas, or (b) very fine dust particles in active Brownian motion.

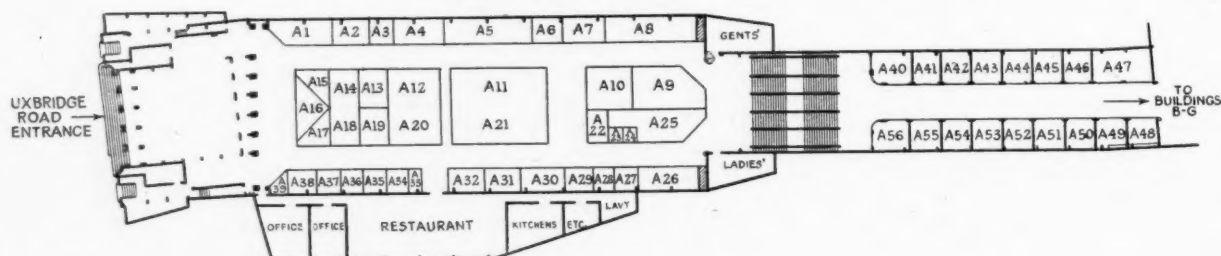
## Chemical Section at the British Industries Fair

### Plan of Stands and Complete List of Exhibitors

We publish below a plan of the Chemistry Section of the British Industries Fair, to be opened at the White City on Monday, February 19 next, together with a complete list of the chemical exhibitors. It will be seen from the plan that the Chemical Hall will, as last year, be entered direct from the Uxbridge Road entrance. Though the number of exhibitors is slightly less this year than last, the chemical section as a whole is considerably larger. Last year the

chemical and dyestuffs exhibits just occupied the hall. This year in addition considerable space beyond the staircase shown on the plan will be taken up with chemical plant exhibits, which constitute a new feature. The arrangements for the chemical exhibits, as usual, are in the capable hands of the Association of British Chemical Manufacturers, acting, of course, in conjunction with the authorities of the Department of Overseas Trade.

Ground Plan of Chemical Section



List of Exhibitors

STAND.	FIRMS.	STAND.	FIRMS.
A 1.	Gas Light and Coke Co.	25.	The British Drug Houses, Ltd.
2.	Hickson and Partners, Ltd.	26.	May and Baker, Ltd.
3.	Brotherton and Co., Ltd.	27.	Stafford Allen and Sons, Ltd.
4.	Ajax Aniline Dye Manufacturing Co., Ltd.	28.	Hopkin and Williams, Ltd.
5.	Scottish Dyes, Ltd.	29.	Thomas Tyrer and Co., Ltd.
6.	Thomas Morson and Son, Ltd.	30.	Intermediates and Explosives, Ltd.
7.	W. J. Bush and Co., Ltd.	31.	T. Lye and Sons.
8.	Boots Pure Drug Co., Ltd.	32.	Southdown Chemical Co., Ltd.
9.	A. Boake Roberts and Co., Ltd.	33.	J. C. Bottomley and Emerson, Ltd.
10.	Burroughs Wellcome and Co.	34.	Grays Dyes and Colours, Ltd.
11.	British Dyestuffs Corporation, Ltd.	35.	B. Laporte, Ltd.
12.	The United Alkali Co., Ltd.	36.	Marley Hill Chemical Co., Ltd.
13.	British Alizarine Co., Ltd.	37.	Spencer Chapman and Messel, Ltd.
14.	Albright and Wilson, Ltd.	38.	Burt Boulton and Haywood, Ltd.
15.	Bowdler and Bickerdike.	39.	Acme Chemical Co., Ltd.
16.	South Metropolitan Gas Co.	40.	
17.	Graesser-Monsanto Chemical Works, Ltd.	41.	The British Chemical Plant Manufacturers' Association.
18.	Albright and Wilson, Ltd.	42.	
19.	Williams Bros. and Co.	43.	T. and C. Clark and Co., Ltd.
20.	The United Alkali Co., Ltd.	50.	Kestner Evaporator and Chemical Engineering Co., Ltd.
21.	British Dyestuffs Corporation, Ltd.	53.	W. J. Fraser and Co., Ltd.
22.	Johnson and Sons, Manufacturing Chemists, Ltd.	54.	Cannon Iron Foundries, Ltd.
23.	Frederick Allen and Sons (Poplar), Ltd.	55.	Mather and Platt, Ltd.
24.	Mr. J. L. Rose.	56.	Association of British Chemical Manufacturers.

## The Purification of Clay

THE name "clay" denotes certain earthy minerals occurring in Nature in immense quantities, the most prominent property of which is that they become plastic when moistened. They can be moulded into various shapes and can be burned to a hard substance. Clay need not occur as a soft material; some of the finest Chinese kaolins are found in the form of a rock, which is reduced to the plastic condition by powdering and prolonged washing. It is usually stated in literature that the purest form of China clay or kaolin has a composition corresponding to the formula  $\text{Al}_2\text{O}_3 \cdot 2\text{SiO}_2 \cdot 2\text{H}_2\text{O}$ .

However, careful mineralogical and chemical investigations of various clays have shown that there exist numerous minerals which are the chief components of typical clays, in which the proportion of alumina, silica and water is altogether different from the above formula. Apart from these components all natural clays contain varying quantities of iron in different forms—silica, lime, magnesia, titanium compounds, alkalies, etc. Iron is the most obnoxious impurity, as it confers on the burned clay a yellow or red colour, which prevents it being used for many purposes; frequently, too, it increases the shrinkage of clay on burning. Silica occurs in the form of sand, consisting of quartz and silicates, which affect the fusibility of clay. Lime is a very objectionable impurity if it occurs as a carbonate, for it effects the rapid softening of clays on burning. Calcium silicates are less harmful. Magnesia acts as a flux and makes the clay soften gradually; therefore, it serves as a corrective for lime and, no doubt, many clays could be improved by a suitable admixture of this substance. Even small amounts of titanium lower the refractoriness of clay to a considerable extent.

Alkalies are considered the most powerful fluxing substances a clay contains; they are usually met in the form of complex silicates, and their fluxing temperature depends not only on chemical composition, but also on their fineness. Purification as a rule aims at the removal of iron, titanium, the coarser forms of silica and silicate, and all kinds of gritty materials. The oldest and still most popular method of purifying clay consists in washing it. The most frequent procedure is as follows:—The clay is soaked in suitable pits, whence it is transferred to washing tanks provided with a mechanical stirring gear. Here the clay is completely broken up and thoroughly mixed with water. From this vessel it is run on to inclined troughs which sometimes total up to 1,000 ft. in length, and bend at angles so as to economise space. All grit and heavier impurities settle out in these troughs. The clay suspension is passed through a fine sieve into large settling tanks, where it is allowed to settle. Most of the water is run off and the residual clay is filter-pressed. Sometimes small quantities of chemicals are added to assist the mechanical breaking down of clay and to insure a sharper separation with a minimum quantity of water. One of the latest improvements in this method is the colloidalisation of clay by means of an appropriate machine which secures a more or less perfect separation of impurities.

Air separation is a further method which has been found useful for certain purposes:—Dry clay is pulverised and transferred to a tunnel where a powerful current of air carries away the finer particles, leaving the coarse ones behind. A very interesting innovation is the electro-osmotic process. It is based on the fact that if an electric current is passed through an aqueous suspension positively charged particles travel to the cathode and negatively charged particles travel to the anode. In some instances the direction of movement of a substance can be altered by adding certain electrolytes to the liquid. Experiments have shown that in a clay suspension clay is electro-negative, silica neutral, iron and titanium positive. If a current is passed through such a system, clay travels to the anode, iron and titanium to the cathode, while silica remains suspended in the liquid. This principle underlies the construction of the "osmose" machine. It consists of a wooden trough with a revolving metal drum which serves as the anode. Surrounding the drum and half-an-inch distant from it is a wire netting serving as the cathode. When a suspension of clay is allowed to flow between the electrodes the clay is deposited on the drum as a continuous layer, while most of the impurities settle upon the wire netting or fall to the bottom, silica being carried away in the stream of

water. Apart from these methods of purification clay is sometimes treated for the increase of plasticity. This is achieved by "ageing" or "souring," i.e., storing in a moist place, or by chemical treatment.

Prolonged storing has been practised by the Chinese and by some famous English potters, such as Wedgwood, and, whatever critics may say about it, results appear to show that storing has a beneficial effect. There are a thousand and one uses for clay, but it may not be generally known that certain kinds are much valued in China as a delicacy, and that kaolin is frequently discovered as an adulterant in various articles of food.

S. P. S.

## Death of Mr. F. E. Weston

WE regret to announce the death of Mr. F. E. Weston, the head of the Chemistry Department at the Polytechnic, Regent Street, London, which occurred at the Middlesex Hospital on Thursday, January 4, after a long and painful illness. He was buried at Streatham Cemetery on January 9. The governors, staff, and students were represented at the ceremony.

Mr. Weston was trained at St. John's College, Battersea, and after a few years of elementary teaching, joined the Polytechnic staff in 1893. Here he soon proved his efficiency as a teacher and an organiser. Many generations of Polytechnic students will remember with gratitude the clearness and simplicity of his methods and the patience and helpfulness of his manner. Many were the visits and letters of old students, who knew that they could freely come to him for advice and help in matters where chemical knowledge was needed.

Mr. Weston was a graduate of London University, where he obtained first-class honours in the B.Sc. examination; from the Board of Education he received the gold medal, as being first in the first class. His studies did not cease with the gaining of his diploma. Later he became a Fellow of the Institute of Chemistry by research, and a Fellow of the Chemical Society.

Some of his publications have made his name widely known; perhaps his chief is "The Detection of Carbon Compounds," which has been translated into French and Spanish. Besides important original papers in the transactions of the Faraday Society and elsewhere, he was the author of an "Elementary Experimental Chemistry," and, in collaboration with Mr. P. J. Fryer, a "Technology of Oils and Fats."

His name was well known in the industrial world; his experimental work on soap-making with clay instead of fat may some day become of great importance. In this connection a series of articles on colloidal clay which he contributed to THE CHEMICAL AGE will be recalled by many of our readers. These attracted widespread attention, and for months after quotations from them continued to appear in the foreign and Colonial technical press.

Mr. Weston leaves a widow and one son, Ramsey, who seems to be following in his father's footsteps, for he was first in the Royal College of Science last summer, and gained a first-class honours degree in science a few weeks ago.

## Organisation of Research at Birmingham

PRINCIPAL GRANT ROBERTSON, of the University of Birmingham states, in his annual report that the Standing Joint Committee of Council and Senate "to organise a policy of research" has been in full working for the whole session, and the appointment of the Committee was a wise step, excellent work having already been done. It is clear that the existence of such a committee has stimulated the impetus towards research, and that the number of applications from the staff will increase. It is above all important, he says, that research should not be identified solely with work carried on by the Faculty of Science, essential as that is, but that every Faculty should realise that original contribution to knowledge is a duty, which is closely connected with efficiency in teaching, and that the influence thereby exercised on the students is incalculable alike in its value and in the attitude of mind it can create.



## British Chemical Leaders on Trade Conditions

### Past Successes and Future Prospects

*While official organisations are lamenting the public indifference to chemistry and, incidentally, doing nothing to correct it, THE CHEMICAL AGE has followed the policy of keeping the public Press informed of important chemical developments from time to time. That this policy is having a good effect is shown by the larger recognition now given to British chemistry by our leading dailies, and the attention which the views of its representative leaders command. As an example, we give below extracts from articles by Sir E. A. Brotherton and Sir William Alexander in the "Yorkshire Post Trade Review" and by Sir Max Muspratt in the "Liverpool Daily Post." Contributions of this kind serve a real purpose in making the work of British chemical industry better understood by the nation.*

#### Sir E. A. Brotherton

It may be supposed that, with the election of a strong Conservative Government, the Dyestuffs Act and the Safeguarding of Industries Act will run their allotted course. Indeed, it is not too much to say that in this the Government has the support of the country. Much of the opposition to these measures is but sound and fury, without substantial backing, and it is noteworthy that four of their most active critics—Major Barnes, Sir W. Barton, Mr. J. D. Kiley, and Mr. Stanley Holmes—were unsuccessful in their Parliamentary candidatures.

Chemical manufacturers who were apprehensive of the return of a large number of Members pledged to repeal these Acts—for election purposes incorrectly described as "the thin edge of the wedge of Protection"—have since been encouraged to extend their programme and lay out additional capital in order to strengthen the position of the industry in preparation for the testing-time which will ensue when the restrictions now imposed upon the importation of dyes and fine chemicals are removed. By so doing, such manufacturers are helping to absorb again into industry workmen who would have remained in the ranks of the unemployed if a larger number of opponents of the "restrictive" Acts had been returned to Parliament.

#### Importance of Trained Chemists

There is a purpose behind the Dyestuffs Act and the Safeguarding of Industries Act which should be stated clearly over and over again until it is thoroughly understood by the mass of the people. It is an attempt to increase the number and quality of the chemists in the country. If the industries scheduled under the Acts are given time to establish themselves—for adequate time has not yet been afforded—they will provide work for a body of highly qualified chemists whose knowledge and trained skill will be of invaluable service to the country should we, by some unfortunate chain of circumstances, again become involved in war.

Nor will the knowledge and skill thus acquired be confined to the few industries concerned. The tendency will be for it to spread into other industries, raising them to a higher scientific level, to the general advantage of the country as a whole. Many processes of industry still proceed by rule of thumb methods. Some have shown little progress for generations, and it is in these that the highly trained scientist will find an appropriate field for ready development. Indeed, it is essential for the well-being of the nation that such opportunities be found, for it is a truism that the race in scientific processes will fall to the most skilled. Great Britain cannot afford to lose any opportunities of increasing her chemical and other technical ability, and whatever tends to add to the number of chemists, and to demand from them greater skill and a closer understanding of manufacturing processes, should be encouraged.

#### German Contact Plant

Towards the end of 1921 it was generally supposed that the great German contact plants, erected during the war, for the manufacture of ammonia from the air would be in a position to produce colossal quantities of ammonia at so low a cost that Germany would dominate the world's markets for sulphate of ammonia. This was a black outlook for the British makers, and many conferences were held with a view to deciding how best to meet the menace. The position changed, however, with dramatic suddenness. The German farmer, whose land had been starved during the war, and who, following the

period of German industrial activity, had money to spend on artificial manures, began to buy freely—so freely, indeed, that it soon became apparent that the whole output of the contact plants was required for home consumption. The German Government, therefore, placed an embargo on export, and the competition threatened to the British maker entirely disappeared. More, Germany was compelled to buy large quantities of sodium nitrate from Chile to make up the shortage of nitrogen in her soil, and probably part of the cargoes of British sulphate, exported to Belgium, were sold across the frontier into Germany.

In the early months of the year, therefore, sulphate of ammonia was in strong demand, and, owing to the cold and wet spring, it found a ready market until well into May. Unfortunately for the British maker, however, his supplies of ammoniacal liquor were very much less than in a normal year, so that he was unable to take full advantage of the position. It was a period of bad trade, factories were shut down, gas-burning plants were standing idle, and the mass of the people were using as little gas as possible, the need for economy being great.

Nor was this all. Many of the coke ovens closed down at the time of the coal strike had not been reopened. Probably less than 50 per cent. were working, and consequently the sulphate maker was deprived of raw material from this source. The shortage had its due effect upon the sulphuric acid industry, the greatest part of whose product goes to the sulphate maker, and upon other industries whose activities are linked up with sulphate of ammonia. So the influence of the coal strike continues. It has been felt throughout the sulphate of ammonia and allied trades in the past year, and it continues still, for ammoniacal liquor is still in short supply, and sulphuric acid, consequently, is in increased demand.

#### Synthetic Ammonia

The general reader may have noticed occasional paragraphs with reference to the manufacture of synthetic ammonia in this country. The process has passed beyond the experimental stage, and fairly large quantities of ammonia are now being produced by the Synthetic Ammonia and Nitrates Co. (Ltd.), an offshoot from Brunner, Mond and Co. (Ltd.), by a method which is allied to that employed in Germany. Preparations for the manufacture on a very large scale of sulphate of ammonia from synthetic ammonia are being pressed forward at Billingham, near Stockton-on-Tees, and it is anticipated that the plant will be put into operation in the early summer. The venture is of great interest to the chemical trade, and may be of enormous importance to the country.

Since about the middle of the year the heavy alkali trade enjoyed a period of comparative prosperity. The cause of this probably lies in the shortage of coal in Germany, for German makers have had reduced quantities to offer to the world's markets. Soda ash has been in strong demand, and as the manufacture of this substance by the prevailing process necessitates the use of ammonia, manufacturers of ammonia liquor have had a better demand for their product than they have experienced for some time. Business in ammonium chloride has improved with the better outlook in the galvanising industry, and there has been a fair demand for this product, and also for ammonium carbonate for export in the later months of the year.

The smaller production of ammonia, to which reference has been made, had an exact parallel in the shortage of tar for the tar distiller, and from the same cause—the coal strike. Men who might have been employed on the roads in 1921 were deprived of work on account of the short supply of tar from

the coke ovens. Road tar was scarce, and business in it was very active. The probability is that the shortage will be felt in 1923. There was a good market for pitch and carbolic acid during the later portion of the year, and it is interesting to note that carbolic acid has been supplied to Russia, though the difficulty of doing any business at all with that country is very great.

#### Labour and Capital

One pleasing feature with regard to the chemical trade is worth mentioning. Labour difficulties are now almost unknown. Wages are stabilised until next March at a level which compares very favourably with pre-war rates, after due regard has been had to the increased cost of living. Work in the chemical trade is now in eight-hour shifts, instead of twelve, and workers receive, as a minimum, one week's holiday per annum with full pay. There is no desire on the part of manufacturers to revert to pre-war conditions.

#### Sir Max Muspratt

The fundamental chemicals of civilisation may be divided roughly into three—alkali, acid, and the products of coal distillation, more specifically described as coal tar products. In alkali, England, and especially Merseyside, has always led the world. For almost a century the Leblanc process was supreme. The Leblanc process, to modern ideas, is unduly complicated, but those very complications made it the mother of almost unlimited by-products, which were developed by other Englishmen, notably Weldon, Deacon, and Chance. With each step in development chemical engineers arose to deal with the various problems, and the solution of these problems and the control of the processes have called into existence and maintained a body of experts in inorganic chemistry which is a real national asset.

#### The Ammonia Soda Process

The next great step in alkali manufacture was the ammonia soda process, originally patented by two Englishmen, Dyer and Hemming, brought into practical industry by a Belgian, Solvay, but perfected at Northwich, in Cheshire. The final development was the electrolytic process. Here the invention was of Continental origin, but the practical development was in Runcorn, Cheshire, though hard on its heels came the process of Hargreaves and Bird, and certain American processes, some of them of practical utility. The best of the latter has been adopted on a large scale at Widnes and Newcastle, with the result that in alkali Great Britain has every range of up-to-date process, has complete control of the neutral markets of the world, and even in the highly protected countries, such as the United States and certain Continental countries, is looked upon as a reservoir in times of shortage and a foe to be conciliated in days of competition. The vast bulk of this development has been on Merseyside.

#### Geographical and Natural Advantages

The great factor has been geographical and natural advantages, combined with generations of experience; the alkali industry requires brine (natural solution of salt), coal, and limestone in close proximity; world trade requires ready access to seaports; and in Widnes, Fleetwood, Runcorn, and Northwich these conditions exist in a degree unequalled in any other part of the world. The next fundamental, sulphuric acid, or vitriol, stands in a different category. Owing to its properties it does not lend itself readily to world trade, but the products for which it is used do, and it has been well described as the lifeblood of an industrial nation in both peace and war. Great Britain was again the pioneer, and thoroughly developed the lead-chamber process, which is the best and cheapest process for the standard commercial product, for the production of superphosphates and ammonium sulphates and countless other industrial products.

In addition, British capital and brains developed mines in Spain, for pyrites, the principal raw material for sulphuric acid, and also worked out the copper extraction processes at home for the utilisation of the cinders from the pyrites in the production of copper and iron ore.

For more specialised forms of sulphuric acid, Germany had the advantage at the outbreak of the war, as there was a large consumption of the special acids made by the contact processes as a result of the development in Germany of the dye

and fine chemical industries; but even in these qualities Great Britain had important nuclei which were developed rapidly during the war, and to which were added large new plants, some of them of great value in post-war times.

Here, again, the geographical and economic position of Great Britain is of great importance, and although there are temporary complications which make it impossible to claim at the moment world-supremacy in sulphuric acid, all the necessary steps are being taken to recover that position at no distant date, especially on the Mersey.

Based upon cheap and good alkali and acid, important industries have grown up which are really branches of chemical industry, though they are now regarded as independent industries, notably soap and glass, paper and artificial silk, galvanising and tinsplate, while the textile industry owes a big debt to the heavy chemical industry on a scale which far surpasses in value and volume the controversial field of dyes.

In all these daughter industries Great Britain is still economically and practically supreme wherever the consumer is free from prohibitive as distinct from revenue duties.

The last fundamental group embraces the products of the distillation of coal. In these Merseyside has taken its part, but East Lancashire and the West Riding are more important in quantity, while London is the greatest centre of all.

As to the immediate outlook, it is satisfactory. During 1922 the position has been slowly but steadily improving from the trough of depression both for export and home consumption, much of the latter being used for goods for export when finished. A continuance of this improvement is fully anticipated, and much of this improvement will be to the benefit of Liverpool.

#### Sir William Alexander

There are features in the record of 1922 which, if not spectacular are of great importance and offer grounds for a hopeful outlook. It can fairly be claimed that during the year there has been a great improvement in the quality of the colours made and, in addition, manufacturers have been responsible for the introduction not only of colours which have not been made here previously, but also of some entirely new groups of colours of great usefulness. Among these may be mentioned new vat dyes, a new class of colours for the dyeing of artificial silk, and an important series of new acid colours. These developments, which are the result of research work, serve to show that in this respect the British dyestuff industry is not limited to following in the footsteps of the Germans, but is showing both enterprise and originality.

By means of research and detailed costing, it has been found possible to make better use of raw materials, to find outlets for by-products, and to make substantial progress towards the elimination of waste. The nature of the services which should be rendered to consumers has been examined and there have been developments with regard to the dissemination of information, the rendering of expert technical assistance, and the issue of pattern cards, in all of which improvements have been made which will be more fully realised in the coming year.

#### Duty to the Community

The dyestuff industry also realises its duty to the community along lines which are not those of ordinary trade. It has done a great deal, and will yet do more, in supporting the efforts of those who are trying to establish a fine chemical industry in this country. It has not been unmindful of the demands of academic research, and has done a great deal to supply some of the wants of the laboratories of our Universities and technical institutions. The industry is realising more fully the usefulness of its products in the service of medicine, surgery, and public health generally, and by collaboration results were achieved in 1922 which lead one to be very hopeful as to the future.

One may confidently assert that the industry is to-day better equipped, better manned, and better directed than at any previous time. It believes in its ultimate success and independence, and it hopes not only for the goodwill of other industries, but for that help from the Government which on national grounds it has reason to expect. It is by sustained effort, clear purpose, and intelligent co-operation that the goal aimed at will be reached.

## Gas Examiners' Qualifications

### Proposals of Institutes of Chemistry and Physics

At the meeting on Tuesday of the Board of Trade Committee which is inquiring into the complaints as to the basis of charging for gas by the therm, the following resolution passed by the Council of the Institute of Chemistry and the Institute of Physics was laid before the Committee by Mr. G. S. W. Marlow, assistant secretary of the Institute of Chemistry:—

"That the Council of the Institute of Chemistry and the Board of the Institute of Physics urge the authorities concerned to require that the qualifications of gas examiners should be defined as follows:—*Attainments.*—(1) Fellows or Associates of the Institute of Chemistry; Fellows or Associates of the Institute of Physics. (2) Any graduate of a recognised university who has taken chemistry and physics in the final examination for his degree. (3) Associates of recognised technical colleges, provided that their diplomas include chemistry and physics: such as the Royal College of Science, the Royal School of Mines, the City and Guilds Central Technical College (incorporated in the Royal College of Science); Finsbury Technical College; Technical College, Bradford; Heriot-Watt College, Edinburgh; Manchester College of Technology; and University College, Nottingham. (4) Qualified engineers with adequate training in chemistry and physics; certified by a recognised university or college. *Experience.*—A candidate for a gas examinership must produce evidence of having actual experience of the work, obtained under qualified supervision, and he must be fully cognisant of the laws and regulations relating thereto. *Professional standing.*—It is desirable that a gas examiner should be a member of a reputable professional body of chemists, engineers or physicists.

"Your Committee will realise that the Gas Regulation Act will be a dead letter unless the persons appointed as gas examiners are qualified to undertake the duties entrusted to them. Already, the Institute of Chemistry has received information to the effect that a number of employees of local authorities and other persons, having no special knowledge or experience of the work, have been appointed to these positions, and there appears to be no mechanism whereby the suitability of appointments made may be challenged. In these circumstances, I am desired by the Council of the Institute of Chemistry to say that if your Committee consider the above resolution to be relative to their inquiry, the Council will be glad to send representatives to give evidence on the matter."

Mr. Marlow emphasised the importance in the public interests of the provision in the Gas Regulation Act as to the competence and impartiality of the gas examiners. He pointed out, however, that there was no provision in the Act for a definition of competence and impartiality and that gas examiners were appointed by local authorities who in many cases were not competent to judge of the qualifications required of gas examiners. He then related the endeavours the Institute of Chemistry had made in 1920, while the Bill was before the House of Commons, to insure the insertion into the Act of such definition, and related further that the Institute had been unsuccessful even in persuading the Board of Trade to give an indication of the nature of the qualifications required.

He referred to the fact that the Gas Referees, who had power only to advise, had issued a memorandum for the information of local authorities in which some guidance as to competence and impartiality had been given, but he remarked that this memorandum contained phrases which lacked definition, and therefore the Institutes of Chemistry and of Physics had endeavoured to provide the necessary definition.

He then reviewed some of the appointments which had already been made with a view to showing that local authorities had in some cases made unsuitable appointments. With regard to the appointment of whole-time officers of the authorities (such as medical officers of health and inspectors of weights and measures), he suggested that it was undesirable in the public interests that an officer should be appointed who *prima facie* was not competent even though personally he might possess qualifications which might be deemed sufficient since the psychological effect upon the public of indubitable evidence of competence was important. Moreover, such persons could not be considered impartial since in cases of doubt they would be biased towards giving a satisfactory report in

view of the fact that failure to maintain an adverse report might possibly endanger their major appointments.

### Tenders for Appointments

Mr. Marlow also criticised cases in which local authorities had advertised appointments to tender, and suggested that persons of good professional standing would be unlikely to apply under such conditions. In further criticism of certain aspects of the Act, he suggested that it was not in accordance with the public interests that the gas examiners should be required in certain cases to give notice to the gas companies of the time at which they proposed to make a test, and further that for the good administration of the Act, it was desirable that provision should be made for separate "lock-up" testing stations so that there might be no doubt as to whether instruments had been tampered with.

In conclusion, he drew particular attention to the desirability of gas examiners being members of reputable professional bodies which had strict rules of professional conduct and could exercise penal powers upon examiners who were guilty of partiality.

In reply to members of the committee, Mr. Marlow said that in order that provision might be made for such regulations as to competency, the Act would require amendment, and he suggested that the Board of Trade or the Gas Referees should be given powers similar to those possessed, say, by the Ministry of Health in the case of Public Analysts under the Sale of Foods and Drugs Act, to prescribe regulations as to competency. He agreed that it would be possible to arrange for the *ad hoc* examination of candidates for posts as gas examiners, such examination to be conducted under the auspices of the Institutes, or, alternatively, to provide for the recognition of existing examinations.

The Chairman of the Committee remarked to Mr. Butterfield, a Gas Referee, that the very wide powers given to the Gas Referees appeared to be rendered void in certain cases, since there was nobody who had a power of veto upon the appointment of incompetent examiners.

Evidence was given by Sir Dugald Clerk, Mr. D. Milne Watson and Mr. George Helps, and the Committee adjourned until January 26.

## National Scientific Workers' Union

### The Support and Utilisation of Science

A RESOLUTION strongly protesting against the policy of the late Government in relation to expenditure on scientific research was passed at the annual meeting of the National Union of Scientific Workers, held on January 13 at the Caxton Hall, Westminster. Dr. A. A. Griffith, who presided, stated in his presidential address that it was the general opinion of men of science that the support of science in this country was quite inadequate considering the needs of the country. He regarded it as absurd that science, the greatest and most permanently valuable of all the learned professions, was also the worst paid, and outlined a general policy for adoption by the Union which aims at remedying this condition of affairs. Scientific workers themselves, he said, must be held largely to blame for their present unenviable position and would only prove their value to the community when they undertook a greater share of responsibility in the control of the product of their labours. Unity, among men of science, was the first essential of success.

Professor Dame Helen Gwynne-Vaughan was unanimously elected president for the ensuing year and the following were elected on the Executive Committee: Professors J. McLean Thompson and H. Levy; Drs. H. Jeffreys, George Senter, J. H. Vincent; Messrs. W. L. Baillie, E. G. Bilham, F. T. Brooks, L. D. Goldsmith, R. McKinnon-Wood, S. W. Melsom and H. V. Taylor.

At the annual dinner, which followed the meeting, the new president said they could proceed in the service of truth by safeguarding the professional honour and the economic freedom of the scientific worker.

Other speakers included Professor J. M. Thompson, Mr. W. Graham, M.P., Professor H. Levy, Dr. A. A. Griffith, Sir T. Holland, Mr. H. W. Brailsford, Major A. G. Church, Professor L. Bairstow, and Mr. S. R. Price. Among others present were Dr. E. H. Rayner, Dr. G. Senter, Dr. H. Smith, and Mr. J. H. Coste.



## The Drying of Oils

### The Chemical Constitution of the Glycerides

A PAPER ON "The Drying of Oils," by Mr. Samuel Coffey, of the Leiden (Holland) Laboratory, was read by Mr. A. E. de Waele at a meeting of the Oil and Colour Chemists' Association held on January 11. The paper pointed out that vegetable oils are glycerides of higher fatty acids, and may conveniently be divided into three classes, according to their powers of drying when exposed to air in thin films at ordinary temperatures.

It was necessary to state the temperature, because there were reasons for believing that all these oils would give tough elastic products if exposed to the air for a sufficiently long time at higher temperatures. Thus, a non-drying oil (*e.g.*, rape seed oil) under atmospheric conditions would remain liquid for an indefinite period, while a drying oil (*e.g.*, linseed oil) would set to a touch elastic product, linoxyn, within a few days. Semi-drying oils (*e.g.*, cotton seed oil) were intermediate between these two. It had been found that this property of drying was closely connected with the chemical constitutions of the glycerides present in the oil in question. Thus, the non-drying oils consisted principally of the glycerides of oleic acid; the semi-drying oils of oleic and linolic acids; and the drying oils of linolic and  $\alpha$ -linolenic acids, together with small quantities of saturated acids in all three cases. A perusal of the accepted formulæ for these acids demonstrated that the drying depended on the degree of unsaturation of the glycerides.

### True Oxygen Absorption Curves

In order to understand the mechanism of the atmospheric oxidation which takes place during the drying process, true oxygen absorption curves must be obtained and full consideration taken of the volatile products. The author stated that in an endeavour to develop an accurate method for obtaining the true oxygen absorption curves, a known weight of oil was distributed in a thin uniform film on a filter paper and oxidised in a known volume of oxygen at 100°C. The volatile products were absorbed as soon as formed by relatively large quantities of pure sulphuric acid and sodium hydroxide. The absorption of oxygen was followed by noting at intervals the alteration in pressure in the apparatus. A correction was then applied to the readings to allow for the alteration in the amount of oxygen present in the system. In this way it was possible to obtain true oxygen absorption curves for linseed oil when oxidised in very thin films in an atmosphere of constant oxygen concentration. Nearly a hundred determinations were made before the work was completed, and it was essential to hurry the reaction and to complete the oxidation as quickly as possible. It was for this reason that a temperature of 100° was chosen, and pure oxygen substituted for air; in this way one determination was completed in a single day. It might be argued that the results obtained under these conditions were not comparable with those obtained at ordinary temperatures in air, or that in the two cases the oxidation takes a different course. The author pointed out, however, that the results in general, where comparison was possible, were in complete agreement with those carried out by previous workers at the lower temperatures.

Passing to a consideration of the results obtained, the first question dealt with was whether the oxidation under definite conditions always proceeded in the same way, and whether the final oxygen absorption, *i.e.*, the true oxygen value, was constant for a given oil. Tables of the figures of results showed, the author contended, that although the amount of oil varied considerably, quite consistent results, to within 1 per cent., were obtained, and that the true oxygen absorption, unlike the hitherto obtained apparent oxygen absorption was a perfectly definite quantity for a given oil.

### Oxidation of Linseed Oil

As in any explanation of the oxidation of linseed oil, due consideration must be taken of the chief volatile products. Quantitative evidence concerning the volatile acids was accomplished by oxidising a known weight of oil, in a stream of oxygen at 100°C., and passing the volatile acids into standard baryta solution. In this way it was possible to obtain the total acids as equivalents of Ba(OH)<sub>2</sub>, and the carbon dioxide, gravimetrically, by weighing the barium carbonate produced. The results obtained with the oil and its fatty acids were highly interesting, and showed that about 5.4 and 5.6 per cent. of carbon dioxide was produced in the two cases, and that for

every molecule of the compound a molecule of a volatile organic acid was also produced. It was also found that the excess oxygen absorption over that required for the addition of a molecule of oxygen to each double bond present in the oil was related to the oxygen in the acetic volatile products in a very simple manner, namely, 3:4. Further, as a result of these experiments on linseed oil and its mixed fatty acids, it was also concluded that the glyceryl radicle played no part whatever in this oxidation, which took place solely with the acid radicles. This fact, the author said, had been suggested as far back as 1888, but had never been directly proved.

Discussing the results in their other aspects, the author said that they showed that the true oxygen absorption was in no way connected, apparently, with the other constants of the oil, such as its iodine value. One of the most important results of the work done by the author was, he suggested, that for the first time it enabled a direct determination to be made of the proportions of the various constituents in linseed oil. The author suggested that the proportions of the constituents in linseed oil might be directly estimated as follows:—The amount of  $\alpha$ -linolenic acid present can be calculated from the amount of carbon dioxide in the volatile products. The true oxygen value gives the combined oxygen absorption of  $\alpha$ -linolenic and linolic acids, and, since the amount of the former is known, the amount of linolic acid may be determined. The iodine value gives the total unsaturation of the oil which is due to  $\alpha$ -linolenic, linolic and oleic acids, and, the two former being already estimated, the amount of oleic acid is also obtainable. Glycerol is estimated directly, and the only constituents not directly determined are the saturated acids and the small quantity of unsaponifiable matter, which are of little importance. A table was given showing the results calculated for the linseed oil used in the experiments, together with the mean result arrived at in previous work by Dr. Friend.

Dealing with driers and their action, the author had concluded that the presence of a drier modified the course of the oxidation of linseed oil, since in every case the oxygen absorption recorded was lower than that observed when no drier was present, and, moreover, the reaction curves were quite different. In the light of these results, it was pointed out that although the drier might remain unchanged—an assumption which had yet to be verified—it did not act as a catalyst in the strictest sense.

A short discussion followed the reading of the paper, during which the probable course of the various reactions was discussed. The President (Dr. Newton Friend) questioned the suggestion that driers did not act as catalysts, pointing out that it was by no means justified by his own experiments. He wondered whether it was not probable that in the oxidation of linseed oil several reactions went on simultaneously, and that the drier was able to catalyse certain of these selectively and so accelerate certain portions of the reaction and give a slightly different result.

### Fertiliser Manufacturers' Affairs

IN the compulsory liquidation of the Britannia Fertiliser Co., Ltd., Parliament Mansions, Victoria Street, Westminster, London, Mr. G. D. Pepys, Official Receiver, has now issued to the creditors and to the shareholders a summary of the statement of affairs which shows liabilities £1,247 expected to rank and assets £20 which are required to meet the claims of the debenture holders, which amount to £1,000. With regard to the shareholders a total deficiency of £3,847 is disclosed.

In his report the Official Receiver observes that the company was registered as a private company on June 29, 1920, with a nominal capital of £3,000, later increased to £3,500, to manufacture and deal in all kinds of fertilisers and manures. On February 7, 1922, the company's stock consisted of 100 tons of basic slag, but as no market could be found it was sold to the landlords in part payment of rent. Two of the directors state that it was their intention to use the company for the manufacture of bricks under a secret process, but that owing to want of capital nothing was done. An agency for the sale of cattle and poultry foods on a commission basis was entered into with the Britannia Products Co., but practically no business was done owing to want of money. The Official Receiver is of opinion that the failure of the company is due to its inability to dispose of its manufactures. The liquidation remains in the Official Receiver's hands.

## December Trade Returns

### Increased Chemical Exports during 1922

A DECREASE in chemical exports of £250,740 and in imports of £68,543, as compared with the preceding month, is recorded in the Board of Trade Returns for December, so that the chemical industry shares in the general decline from the comparatively high level attained in November; this fall is largely discounted by the curtailment of the working period on account of the Christmas holidays. As compared with December, 1921, the imports and exports show increases of £26,015 and £118,104 respectively. Imports for the twelve months ended December 31 last were £1,246,087 less than in 1921, while exports for the same period were £1,242,612 more.

### First Imports of Nickel Oxide

A comparison between the quantities of chemicals imported in December and November of last year respectively reveals fewer large fluctuations than usual, the most outstanding increase being shown under nickel oxide; none of this commodity was imported in the preceding eleven months. There was a considerable diminution in imports of potassium compounds other than nitrate, and of sodium nitrate.

The detailed import figures for the month in cwt., unless otherwise stated, are given below, with the November figures in parentheses:—INCREASES: Tartaric acid, including tartrates not elsewhere specified, 2,256 (1,049); bleaching materials 3,830 (3,090); borax, 5,477 (4,040); red lead and orange lead, 5,241 (3,822); nickel oxide, 3,407 (nil); potassium nitrate, 13,312 (8,401); sodium compounds other than nitrate, 26,798 (23,487); cream of tartar, 3,833 (2,227); and zinc oxide, 610 tons (588). DECREASES: Acetic acid, including acetic anhydride, 303 tons (582); calcium carbide, 62,633 (82,301); crude glycerin, 562 (868); distilled glycerin, 215 (245); potassium compounds other than nitrate, 308,073 (458,933); and sodium nitrate, 72,040 (179,084).

### Ammonium Sulphate Exports Higher

There are few noteworthy increases to be seen on the export side beyond sulphate of ammonia, which shows an increase of 3,896 tons on the previous month's figures, and potassium nitrate, which exceeds the November total by 1,151 cwt. The figures for coal-tar products are all reduced, the cases of tar oil and creosote, 2,558,044 galls., and benzol, 3458 galls. less, being the most outstanding. The figure for potassium compounds other than chromate and bichromate, and nitrate, at 1,925 cwt. is exactly the same as that recorded for the preceding month, but the value for the month under review is £1,777 less. Shipments of sulphate of ammonia amounted to 17,954 tons, of the value of £302,666, the largest proportion of which, 7,686 tons, went to the Dutch East Indies. Spain and the Canaries took 4,579 tons, France, 1,180 tons, Japan 1,000 tons, the British West India Islands, 276 tons, and other countries 3,233 tons.

The following figures show in detail the products for December exports of which were larger (as to quantity) than in the preceding month; the November totals are given in parentheses and the figures represent cwt., unless otherwise stated:—Tartaric acid, including tartrates not elsewhere specified, 2,522 (1,098); sulphate of ammonia, 17,954 tons (14,058); potassium chromate and bichromate, 3,248 (2,191); potassium nitrate, British Prepared, 2,061 (910); sodium carbonate, including soda crystals, soda ash and bicarbonate, 467,168 (437,478); and caustic soda, 123,055 (121,728).

The decreases, similarly compared, are:—Sulphuric acid, 758 (1,076); ammonium chloride (muriate), 412 tons (456); bleaching powder, 25,084 (25,484); benzol and toluol, 1,977 galls. (5,427); carbolic acid, 7,500 (10,000); naphtha, 2,239 galls. (5,949); naphthalene, 7,100 (9,927); tar oil, creosote, 380,089 galls. (2,938,137); coal-tar products, other sorts, 25,414 (27,235); copper sulphate, 859 tons (2,282); crude glycerin, 1,473 (2,991); distilled glycerin, 6,921 (14,021); sodium chromate and bichromate, 4,571 (4,692); sodium sulphate, including saltcake, 133,763 (174,726); sodium compounds and other sorts, 42,835 (49,425); and zinc oxide, 150 tons (222). Chemicals, all other sorts, a heading under which no quantities are given, appear as £275,075, a decrease of £83,524 on the November exports.

### Large Imports of Synthetic Indigo

While only 7 cwt. of synthetic indigo were imported during the other eleven months, December saw the arrival of 5,107 cwt. of the value of £2,906. Alizarine, at 1,968 cwt. was 1,584 ahead of the November figure, while coal-tar intermediates have fallen from 24 cwt. to 1 cwt. The comparative import figures for December and November are respectively:—Coal-tar intermediates, 1 (24); alizarine, 1,968 (384); synthetic indigo, 5,107 (nil); dyestuffs, other sorts, 3,475 (6,581); cutch, 7,525 (2,205); dyeing extracts, other sorts, 10,792 (14,038); natural indigo, 17 (49); and tanning extracts, solid or liquid, 97,509 (80,367).

### Lower Dye Exports

Exports of dyes and dyestuffs were lower, the total of 7,366 cwt., of the value of £48,076, being less than the November shipments by 5,119 cwt. and £11,787. The month's exports comprised 3,603 cwt. of the value of £41,343, and 3,763 cwt. of other sorts, valued at £6,733. The exports for the year amounted to 100,357 cwt., valued at £710,703, as compared with 130,144 cwt. priced at £1,552,898 exported in 1921.

### Painters' Colours and Materials

Imports of painters' colours and materials were slightly larger, with the exception of unenumerated materials, but exports were invariably lower; the reductions, however, were small in most cases, the bulk total being only 17,450 cwt. less than the November one. The comparative figures are:—IMPORTS: Barytes, ground, including blanc fixe, 52,538 (48,437); white lead (basic carbonate), 12,165 (11,188); and painters' colours and materials, other sorts, 41,840 (42,685). EXPORTS: Barytes, ground, including blanc fixe, 1,463 (5,076); white lead, 13,858 (14,897); paints and colours, ground in oil or water, 25,924 (29,823); paints and enamels, prepared, including ready mixed, 19,901 (20,566); and painters' colours and materials, other sorts, 39,529 (47,763).

## The Arsenic Position in America

### Shortage Attributed to Small Demand in 1921

As a result of the recent investigation of the situation in regard to production of, and probable demand for, calcium arsenate in the U.S.A. during the present year, the opinion is expressed in an American contemporary that ample supplies will be available by the time they are needed for boll weevil control. The shortage of calcium arsenate last year is reported to have resulted in the loss of large quantities of cotton, and the investigation discloses the fact that an unusual combination of circumstances prevented a correct estimate of the 1922 demand for the products of which arsenic is the base.

There is no tendency to blame the manufacturers, and the investigators found no evidence of any concerted effort to raise prices. The explanation given is that the demand in 1921 was abnormally small, and this left large stocks at the close of the year; in view of these stocks manufacturers did not undertake large production in 1922. Their failure to make contracts caused the price to slump to the point where it was no longer profitable for the smelters to refine their grey arsenic. The demand which wiped out the stocks came suddenly, with the result that production could not be brought quickly to the point necessary to supply the demand.

Dr. B. R. Coad, of the U.S. Department of Agriculture, has estimated that whereas some 3,200 tons of calcium arsenate were used in 1922, the requirements for 1923 will be about 9,000 tons, excluding supplies for other products in which arsenic is employed.

A report prepared by the Department of Agriculture in response to complaints of plant damage when calcium arsenate was used to kill the cotton boll weevil, states that of the calcium arsenates examined, none of those stored in sheet metal drums or in tight hardware barrels, with possibly one exception, suffered sufficient change in twenty months to be injuriously affected for use from the standpoint of plant toxicity. In a few cases where calcium arsenate was stored in unlined and in paper-lined veneer drums, and in unlined and in paper-lined sugar barrels, the calcium arsenate at the end of the twenty-month period contained soluble arsenic oxide in sufficient amount to make doubtful its safety for application on certain foliage.

## Training for Industry too Academical

To the Editor of THE CHEMICAL AGE.

SIR,—It is suggested by many authorities that the over-crowding and unemployment among chemists is due to too much specialisation. In my opinion the reverse is the case, and I attribute it to the lack of this factor. It is a favourite argument of scientists that one's training should be as general as possible, and the fundamental principles of pure chemistry dinned into the student's head. From an academical and educational point of view I agree, but when one comes to the actual business of finding a situation, the case is different. Specialised practical knowledge is, in nearly every case, asked for, and, after all, the whole aim of those training for industrial chemists is to obtain work in this branch of science. Employers do not care a jot whether their applicants have an intimate knowledge of the Quantum Theory, Nernst's Heat Theorem, or the hieroglyphics of Thermodynamics: all they want is "maximum work" and "free energy."

There are two classes of chemists generally recognised—the pure and the applied; and, as far as I can see, the University courses cater only for the former and leave the latter in an unqualified position to seek works employment.

Parents seem increasingly to realise that nowadays a University training of some sort is a necessity, and allow their sons and daughters to choose their own subject of study. These latter, having been fascinated, in their school days, by chemistry, take it as their course without, at the moment, actually realising that it must finally become their profession in life. They leave the University trained as "pure" chemists and ultimately in most cases find their way to industry. There are again those who start out with the object of qualifying for the practice of chemistry, and there being no "applied" chemistry courses and exams, within easy reach, are compelled to take a course in "pure" chemistry. These two starting out with different objects in view leave the University trained in precisely the same manner and consequently clash.

I suggest that if the "pure" chemists have "pure" training and the "applied" be restricted to the "applied" branch, the number in the latter category would be lessened.—Yours, etc.,

UNEMPLOYED.

January 13, 1923.

## The Faraday Society

### Spontaneous Viscosity Changes during Gelation

In a paper on "The Reversible Sol to Gel Transition in Non-Aqueous Systems," by Mr. E. W. J. Mardles, read at a meeting of the Faraday Society on Monday, the author concluded that the viscosity value of a sol during its gelation was dependent to a considerable extent on the method and conditions of its determination, and since the system was heterogeneous, the viscosity value lost its real significance. He expressed the change of apparent viscosity with time during the gelation of a sol of cellulose acetate in benzyl alcohol by an empirical formula. It was also found that the relation between the maximum gelation temperature and concentration resembled that between temperature and the saturation concentration for crystalloids.

The viscosity-time changes associated with the gel to sol transition had been measured at various temperatures and with different concentration systems of cellulose acetate in benzyl alcohol. It was found that the viscosity at first rapidly diminished, the rate of change becoming smaller until a constant value was obtained. In many cases, although the system appeared to be fluid, the final viscosity was abnormal, indicating that there were still present in the system portions of the original gel structure. The minimum temperature at which there was a complete return to the original viscosity of the sol without mechanical treatment had been referred to as the minimum solation temperature, and this temperature was determined approximately for different concentrations. Mechanical treatment hastened solation in the same way that it retarded gelation. The time taken for a system to attain constant viscosity or mobility depended to a considerable extent on the previous treatment and age of the gel. The hysteresis effect observed during the sol=gel transition could be measured by the difference in the temperature of minimum solation from that of maximum gelation, and the cause of it had been ascribed to the different conditions of the particles in the gel and sol state respectively.

## Efficient Steam Generation

### Control Methods Needed in the Dyestuffs Industry

At a meeting of the Scottish Section of the Society of Dyers and Colourists, held in Glasgow on January 12, Mr. James Crawford presiding, Mr. David Brownlie read a paper on "Efficient Steam Generation in the Dyeing and Allied Industries."

Mr. Brownlie said he had made a complete investigation of the working of the boiler plants of 65 different works in the dyeing and allied industries comprising 217 boilers with a total coal consumption of 275,637 tons per annum. As a result he found the net working efficiency of the whole of the 65 plants was approximately 61.41 per cent.; 52 per cent. of the plants were working at less than 60 per cent., whilst only 7.6 per cent. exceeded 70 per cent. The average for the whole country in over 50 industries was about 58 per cent., whereas the figure ought to be 75 per cent. He held that at least 20 per cent. of the coal burned in the dyeing and allied industries could be saved by adopting proper scientific methods in the fire-hole, and that throughout the whole country, of the total amount of 90,000,000 tons of coal burned per annum for steam generation in all industries, at least 20,000,000 tons were wasted through the lack of proper methods. These figures were based on the results of 15 years' continuous testing of boiler plants, including nearly 500 plants with a coal bill of over 4,000,000 tons per annum, and a personal inspection of 2,000 plants with a total coal bill of 15,000,000 tons per annum.

### Causes of Low Efficiency

Mr. Brownlie then dealt in detail with the causes of low efficiency. The difficulties, he said, were due to lack of sufficient draught, bad design of the flues (which were generally too small and cramped), combined with leaky brickwork and inefficient firing, whether by hand or mechanical means. Also the grate length was generally excessive, and nothing like sufficient use was made of superheaters. Further, there was generally an insufficient installation of economisers for heating the feed-water.

On many plants a grossly excessive amount of steam was wasted in steam jet furnaces, both hand and mechanical, the average amount of steam used by these being 6½ per cent. of the production; while there was also trouble with the feed-water in the way of scale and corrosion.

Lastly, and most important of all, there was an almost entire lack of proper scientific methods for controlling the plant; there were no continuous records kept of the weight and analysis of the coal and the feed-water evaporated, and combustion recorders, pyrometers, draught gauges, etc., were conspicuous by their absence.

### Silvanus Thompson Memorial Lecture

THE first Silvanus Thompson Memorial Lecture will be delivered at the Finsbury Technical College, Leonard Street, London, E.C.2, by Sir Oliver Lodge, F.R.S., on Thursday, February 1, at 7.30 p.m., Sir Charles Parsons presiding. After the lecture a conversazione and re-union of old students will be held. Guests will be received by the chairman of the College Delegacy, Mr. L. B. Sebastian, the Dean, Dr. W. Eccles, F.R.S., and the President of the Old Students' Association, Mr. W. M. Mordey. A collection of Dr. Thompson's paintings and apparatus will be shown, and a number of scientific demonstrations will be given in the laboratories by eminent past students and associates of the College. Tickets may be obtained (gratis) from the Hon. Secretary of the Silvanus Thompson Memorial Lecture, Finsbury Technical College, Leonard Street, London.

### Business Men should Travel

"HALF the trouble," says the *European Commercial*, "is that business men do not travel enough, with the result that their imagination lies dormant and their hope passive, because the countries where customers abound remain to them mere names, or, perhaps, shapes on the map. For all the difficulties of the post-war situation, Europe is crowded with neglected opportunities. New sets of problems offer also new opportunities to the man who can face them with courage and energy."



## Cumberland Coal Power & Chemicals, Ltd.

### Voluntary Liquidation Confirmed

A MEETING of the creditors interested in the voluntary liquidation of Cumberland Coal Power and Chemicals, Ltd., Grosvenor Place, London, was held recently at the offices of Messrs. Vincent and Goodrich, 13, Queen Street, London. Mr. A. Clarke Vincent, the liquidator, submitted a statement of affairs which disclosed liabilities £215,648 17s. 10d. Of that amount £68,460 12s. 9d. was due to unsecured creditors, while there were creditors for secured notes and interest accrued amounting to £210,600. These creditors held estimated securities to the value of £63,411 14s. 11d., and were shown as unsecured for the balance of £147,188 5s. 1d. The assets were estimated to realise £64,295 1s. 9d., from which had to be deducted preferential and distrainable claims of £883 6s. 10d. The net assets, therefore, were £63,411 14s. 11d. These net assets were insufficient fully to discharge the claims of the holders of the secured notes and interest, and there was therefore a deficiency so far as the unsecured creditors were concerned of £215,648 17s. 10d. The assets were as follows: Cash at bank and in hand, £209 11s. 3d.; uncalled capital, £33,050 13s. 6d.; investments valued at £30,000; furniture, fittings, and fixtures, £1,923 18s. 9d., expected to produce £1,000, and sundry debtors, £34 17s.

The statement showed that there was a lease at Bolton Waverton area which cost the company £3,629 17s. 6d., on which no value was placed. The leasehold premises at 31-32, Grosvenor Place and 31-32, Chester Mews had cost the company £6,023 2s., but no value was now placed upon it. It also appeared that the company's books valued at £283,105 an agreement which had been entered into but which the vendors sought to cancel, claiming retention of all monies paid; for the moment no value was placed upon the item. In addition to the liabilities mentioned there were bills payable which had been issued as collateral security to the extent of £60,000, while an indemnity had been given in respect of advances to another company to the extent of £56,000. The company had also entered into an agreement to purchase shares to the value of £392,000, but in that direction there was security of about £300,000. The company had further agreed to purchase 90,000 shares at 30s. each in another concern. The issued capital of the company was £250,000, and the deficiency as regarded the shareholders was £465,648 17s. 10d. With regard to the capital account there had been issued and called shares to the value of £216,271 16s. 6d., while shares of the face value of £33,728 3s. 6d. were put down as "uncalled."

The deficiency account showed that the expenditure of the company had amounted to £37,529 19s. 11d., but there had been dividends on investments totalling £10,900 6s. 6d., leaving a net expenditure of £26,629 13s. 5d. There had been losses and depreciation written off to the extent of £439,019 4s. 5d., made up as follows: Claude Synthetic Process £54,742 4s. 8d.; Crookdale option, £50; Allerdale Coal Co., Ltd., shares, £6,683 14s. 2d.; Oughterside Coal Co., Ltd., shares and loan, £45,182 2s. 8d.; Moresby Coal Co., Ltd., shares, £31,914 7s. furniture, fixtures, and fittings, £923 18s. 9d.; lease, Bolton Waverton area, £3,629 17s. 6d.; leasehold premises, £6,023 2s. A. S. Tyssefaldene, purchase, £283,105 2s. 7d. (which included acceptances amounting to £58,000; and secured notes for a like sum, the latter having been issued as collateral security for the former), preliminary expenses, £1,156 10s.; prospecting, drilling and experimental expenses, £5,608 5s. 1d.

After the matter had been discussed it was decided to confirm the voluntary liquidation of the company, with Mr. Vincent as liquidator. Among the principal creditors are: H. Ballantyne, £1,068; A. Blackman and Co., £260; R. Blackstead, £6,500; Brockbank and Co., £598; Dr. Jacques, £150.

### Proposed French Cellulose Institute

A PROPOSAL to establish an Institute of Cellulose at Grenoble is reported to be under consideration in France. According to the preliminary particulars which are now available, the Institute will include a laboratory for the preparation of the cellulose, the equipment of which will include models illustrating the processes of electrolytic bleaching by sulphite, etc. The manufacture of viscose and of artificial silks, as well as the nitro-celluloses, cellulose acetate, and celluloid, will also be investigated.

## French Soda and Ammonia Works

### Proposed Government Support

IN his Paris letter to the *Journal of Industrial and Engineering Chemistry*, M. Charles Lormand refers to the action of the French Government in an endeavour to escape from the soda monopoly enjoyed by the Solvay Société. A project to establish a soda factory which should be the property of the Government, under the direction of the Powder Service, has been abandoned in favour of a scheme for establishing a soda factory in the vicinity of Bayonne. According to M. Lormand the State has advanced 8 million francs for the construction of this factory, which will be used for the manufacture of sodium carbonate by the ammonia process. The yield is estimated at 100 tons per day of sodium carbonate capable of being converted into 75 tons of caustic soda.

The participation of the State in the installation of this factory is, he says, an indication that the French government intends to assume control of factories useful in case of war. It is also interesting to note that the case of soda has a parallel in the case of ammonia.

The Finance Committee of the House has approved the project for the manufacture of synthetic ammonia. The contract of 1919 between the Ministry of Industrial Reconstruction and the Badische Anilin und Soda Fabrik has just been carried out, and the ancient powder mill of Toulouse has been equipped to produce nitrogen by the Haber process. The society has a capital of 50 million francs, of which 20 millions have been subscribed by the syndicates, corporations, and agricultural associations, the Chambers of Commerce, the syndicates of chemical products and the workmen's syndicates; the other 30 millions were furnished by the State. The society will be governed by a council of administration formed of technologists and representatives of consumers of nitrogenous fertilisers.

### A Cream of Tartar Prosecution

AT the Manchester County Police Court on Tuesday, Harry Gorton, of Gordon Street, Old Trafford, Manchester, was prosecuted at the instance of the Lancashire County Council for selling as cream of tartar a substance which, on analysis, proved to be something quite different. For the prosecution it was stated that a sample of the substance sold by the defendant as cream of tartar was analysed by Mr. Collingwood Williams, who found it to be entirely devoid of cream of tartar. It was stated that the material was generally known as cream of tartar substitute, and was sold wholesale at about half the price asked for the real article. For the County Council, Mr. Scrymgeour said he understood that the defendant was going to rely upon a warranty. This was really the invoice, and counsel submitted that this was not a warranty as required by the Act. The Bench decided that the invoice was not a warranty. Mr. W. Murray, for the defendant, said his client had asked for cream of tartar, had paid a proper price for it, and had received an invoice describing the material as cream of tartar. The case was dismissed on payment of costs.

### A Scientific Expeditionary Research Association

THE Scientific Expeditionary Research Association which is now being formed will act in conjunction with scientific societies and institutions for the purpose of facilitating and promoting scientific research by means of expeditions to all parts of the world. As many individual societies are not endowed with funds to enable them to undertake work of this kind it has been decided to make the Association responsible for raising the necessary funds. The Association, whose offices are at 68, Pall Mall, London, will be conducted on the same lines as other scientific societies with the addition, however, of an advisory council composed of members of all the institutions interested in or affiliated to it. It is intended that Fellows, Members or Associates of any scientific body which might possibly benefit through the help or co-operation of the Association shall be eligible for membership, as well as any person interested in science who may desire to take advantage of the facilities for travel and research which the Association will offer. Arrangements are now being made for an expedition to the South Pacific in the early summer of this year.

## From Week to Week

MR. ARTHUR CAREY, district manager of the United Alkali Co., Ltd., has relinquished his position on account of his health.

LADY RECKITT, wife of Sir James Reckitt, chairman of Reckitt and Sons, Ltd., Hull, died on Tuesday at the age of 78.

MR. CARL PAUL GOERZ, founder of the famous German firm of optical instrument makers, died on January 14 at his villa in the Grunewald.

A NEW PROCESS for the production of diphenylamine from aniline, using hydrochloric acid as a catalyst, has been patented in America.

A NEW SYNTHETIC DRUG known as butyn, discovered in the Abbott Laboratories, Chicago, is claimed to be a good substitute for cocaine.

VICTOR BLAGDEN AND CO., LTD., chemical merchants, 4, Lloyds Avenue, London, E.C.3, have opened a branch office at 92, Market Square, Manchester.

SIR WILLIAM PEARCE is a member of the committee appointed by the Chancellor of the Exchequer to consider simplifications in the various income-tax forms and notices.

A NOTE on an apparatus for small scale flotation tests, by H. L. Sulman and H. F. K. Picard, was read at a meeting of the Institution of Mining and Metallurgy on Thursday.

OF TWENTY SAMPLES OF BORAX recently examined in the City of London, thirteen were found to contain arsenic. Of these latter, five conformed to the British Pharmacopœia, and eight contained an excess.

BRITISH DYES have almost disappeared from the Indian market, according to the Canadian Trade Commissioner in India, who states that Germany is now supplying 80 per cent. of the Indian requirements.

MR. CHARLES ROBERTS has been re-elected chairman, Dr. Alfred Rée vice-chairman, and Mr. F. P. Bayley hon. secretary, of the Chemical and Allied Trades Section of the Manchester Chamber of Commerce.

SIR WILLIAM BRAGG has chosen the subject of "The Newer Methods of Crystal Analysis, and their Bearing on Pure and Applied Science" for his Trueman Wood lecture to be delivered before the Royal Society of Arts on January 24.

THE PRACTICAL USE of the microscope in industrial research will be furthered by the formation of a new section of the Royal Microscopical Society, the inaugural meeting of which will be held at 20, Hanover Square, London, on January 24, at 7 p.m.

FOLLOWING on the satisfactory liquefaction of helium in the Physical Laboratory of the University of Toronto, Dr. McLennan is contemplating the investigation with the cryogenic equipment in the laboratory of many problems connected with refrigeration.

SPEAKING at a Home Counties Liberal Association meeting at Eastbourne, on Monday, Sir John Simon alleged that the Dyestuffs Act was causing the textile manufacturers of Manchester and the West Riding to send their undyed cloth to be dyed by foreign workmen.

CORY BROTHERS AND CO. are reported to have acquired the Thames-side munition works of Kynochs, Ltd., together with the residential area known as Kynochstown, with a view to the erection of oil storage tanks with a capacity of some millions of gallons.

BRITISH SOAP and candle makers are, according to a Consular report, rapidly losing their hold on the Tangier market. Samples of the French soap, which is now favoured in this market, may be seen at the Foreign Samples Exhibition, 7-11, Old Bailey, London, E.C.4.

FIVE MEN were injured by the explosion of a nitrator at the Huddersfield works of the British Dyestuffs Corporation, Ltd., on Tuesday. All five were suffering from acid burns, and they were detained for treatment at the Huddersfield Infirmary. One is in a critical condition.

AN OUTBREAK of FIRE occurred at the carbon works of J. Durrans and Sons, Penistone, near Huddersfield, last week. The fire originated in the main portion of the works, and it is thought the entire carbon-manufacturing plant will have been destroyed. The loss is covered by insurance.

JAMES POWELL AND SONS, LTD., are moving from the old-established Whitefriars Glass Works, London, to new

premises at Harrow. The old works were built towards the end of the seventeenth century, and it is claimed of the furnace fires that they have never been extinguished in two hundred years.

WE REGRET to announce the death at Lincluden, The Grove, Giffnock, of Mr. James Young Alexander, managing director of Alexander Cross and Sons, Ltd., fertilisers and chemical manufacturers, 19, Hope Street, Glasgow. Mr. Young, who is 53 years old, had been connected with the firm for nearly forty years.

MR. WILFRID WYLD, F.C.S., consulting chemical engineer, of Leeds, has now returned from India, where he has just completed and put into successful operation the largest sulphuric acid plant in that country, and has also erected several subsidiary plants for the purpose of utilising the bulk of the acid produced.

PROFESSOR F. G. DONNAN has been appointed president of the Chemistry Section of the British Association for its next meeting, to be held in Liverpool from September 12-19 next, under the presidency of Sir Ernest Rutherford. Professor J. C. McLennan will be president of the Mathematics and Physics Section.

DR. G. P. METZ, a brother of Col. Herman A. Metz, of H. A. Metz and Co., the American dye manufacturers and importers, sailed for New York on January 6 for a six or eight weeks' tour of the United Kingdom, France, and Germany. Dr. E. R. Pickerell, of the same company, is understood to be accompanying him.

WITH RESPECT to the essay on the centenary of the United Alkali Co., published last week, it should be added that the figures it contained of products supplied by the company to the Government during the war, large as the totals were, are far below the total tonnage of those and other products actually supplied by the company for war purposes.

STATISTICS prepared from official German returns show that the German exports of chemicals and dyestuffs for the nine months ended September 30 last amounted in bulk to 383,926,300 kilos as compared with 854,659,200 kilos exported in the corresponding period of 1913. Owing to territorial and other changes the figures for 1922 are not strictly comparable with those for 1913.

MR. W. J. HOLLINWORTH, secretary of the British Acetylene and Welding Association, in a statement to the Press regarding a fire on a lorry loaded with dissolved acetylene in cylinders and calcium carbide, expresses the opinion that the fire originated in the petrol tank of the lorry. He points out that dissolved acetylene in cylinders is rightly considered as non-explosive, and is exempted from the provisions of the Explosives Act.

MRS. C. S. GARLAND, the wife of Mr. C. S. Garland, M.P., managing director of Lighting Trades, Ltd., presented the prizes at a carnival dance given by the Iris Social Club (Curtis's and Harvey, Ltd.), at Wandsworth, on January 8. Mr. Garland, in a brief speech, alluded to the operation of the Safe-guarding of Industries Act in relation to the gas mantle industry, and spoke in appreciative terms of the work of Sir J. Norton Griffiths, M.P., in this connection.

DR. GEORGE LUNGE, Professor of Chemical Technology at the Polytechnikum, Zürich, died on January 3 in his 84th year. He was the author of a number of standard works on the heavy chemical industry and has been described as one of the foremost exponents of technical chemistry in our time. In his early days he was connected for some years with a chemical concern at South Shields. He delivered the first Hurter Memorial Lecture to the Society of Chemical Industry.

MR. JOHN MORRIS WEISS, until recently director of development of The Barrett Co., and Mr. Charles Raymond Downs, formerly chief chemist of The Barrett Co., and more recently engaged in special plant development work at the Buffalo plant of the National Aniline and Chemical Co., have formed a partnership as consulting chemists and chemical engineers under the name of Weiss and Downs. They have taken an office in the Chemists' Building at 50, East 41st Street, New York City, and will shortly have laboratory facilities available there. Both of them are known for their many inventions in the fields of coal tar products, synthetic organic chemicals and catalysis. Recently they received an award of the Howard N. Potts Gold Medal from The Franklin Institute for the production of maleic acid by the catalytic oxidation of benzene.

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(Continued on page 67)

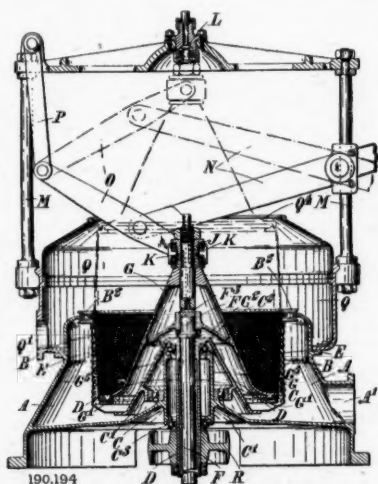


## Patent Literature

### Abstracts of Complete Specifications

190,194. CENTRIFUGAL FILTERS. F. Lamplough and N. C. T. Harper, 25, Victoria Street, London, S.W.1. Application date, September 16, 1921.

The object is to facilitate the removal of the filter cake from the flexible filtering material which is supported by a rotating basket. A fixed chamber A is provided with a central hollow boss C carrying ball bearings C<sup>1</sup>, C<sup>2</sup>, C<sup>3</sup>, which support the rotating basket B, and its driving sleeve D and pulley R. The shaft F carries a conical false bottom G attached to the lower edge of the liner E by a ring G<sup>1</sup>. A diaphragm G<sup>2</sup> is supported on the shaft F, and is provided with perforations G<sup>3</sup> at its junction with the member G. The upper end of the shaft F is provided with bearings J for a collar K, which may be moved vertically by a system of levers N, O, P carried by the framework M. The lower chamber A is provided with an outlet A<sup>1</sup>, and an upper chamber Q with an outlet Q<sup>1</sup>. The material to be filtered is fed through the opening Q<sup>4</sup> in the top



of the upper chamber, and the filtrate is discharged into the lower chamber A. When the flexible filtering material requires cleaning the shaft F is raised, together with its connected parts, by operating the lever N. The filtering material, which is connected at its upper end with the rim B<sup>2</sup>, is thus turned inside out by the raising of its lower edge. The filter cake is now on the outside of the filtering material, and is displaced by centrifugal action. This is assisted by steam which is supplied through a fitting L and thence through the hollow shaft F, which has been raised into contact with the fitting L. The steam passes out through the openings F<sup>3</sup> and perforations G<sup>3</sup>. The solid material removed passes into the chamber Q, and thence to the outlet Q<sup>1</sup>, and the filtering material may then be lowered into its working position. The whole cleaning operation may take place without stopping the rotation of the filter.

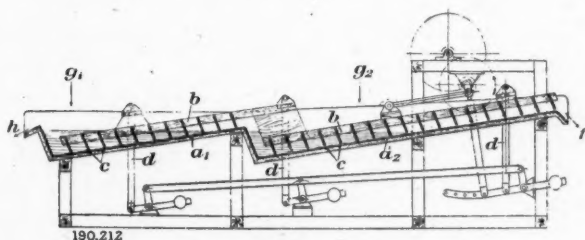
190,203. COAL GASES, RECOVERY OF VALUABLE PRODUCTS FROM. J. Y. Johnson, London. From Badische Anilin and Soda Fabrik, Ludwigshafen-on-Rhine, Germany. Application date, August 17, 1921.

The process is a development of that described in Specification No. 170,152 (see THE CHEMICAL AGE, Vol. V, p. 635), which describes a method for treating gases to free them from tarry matter and sulphur compounds. It is now found that benzene hydrocarbons must be completely removed from the gases before the removal of sulphur. The coal gas is first freed from tar, cyanogen compounds, and part of its ammonia, and is then mixed with a small quantity of air and passed into a series of towers containing granulated active charcoal, such as that obtained by charring wood with an addition of zinc chloride. Ethylene and its homologues are absorbed by the

first tower, but are displaced by benzene and its homologues, and finally by the sulphur deposited. To prevent contamination of the ethylene with ammonia, the gas is washed with aqueous sulphuric acid before entering the tower in which it is finally absorbed. Instead of absorbing the ethylene, it may be converted into halogen compounds which are then absorbed by the active charcoal. Organic sulphur compounds and sulphur are mainly retained in the first towers and must be separated from the benzene hydrocarbons. As soon as any one of the towers ceases to be efficient, the charcoal is regenerated, and the absorbed product recovered by treating it with steam. It is found that those towers used for the absorption of benzene require regeneration more frequently than those used for the absorption of sulphur compounds.

190,212. CONTINUOUS LEACHING OF ORES, METALLURGICAL PRODUCTS AND OTHER MATERIALS ON THE COUNTER-CURRENT PRINCIPLE, PROCESS FOR. A. L. Mond, London. From Metallbank und Metallurgische Ges., Akt.-Ges., 45, Bockenheimer Anlage, Frankfurt-on-Main, Germany. Application date, September 10, 1921.

The ore to be treated is supplied to a trough a<sup>1</sup> at the point g<sup>1</sup>, and is finally discharged from the trough a<sup>2</sup> at f. The liquid is supplied to the trough a<sup>2</sup> at g<sup>2</sup>, and leaves the trough a<sup>1</sup> at h. A long beam b is provided with blades c, and is suspended on levers d in such a manner that it may be given



an elliptical movement. It is found that a much more effective mixing of the ore and liquid is obtained by the use of an elliptical movement than by a circular movement, and the possibility of any of the liquid being moved in the wrong direction is eliminated. The apparatus has been found to be particularly suitable for leaching zinc ores with sulphuric acid, and the capacity of the apparatus has been found to be many times greater than that of other leaching apparatus of similar dimensions.

190,246. COPPER ORES, TREATMENT OF. W. G. Perkins, 62, London Wall, London, E.C.2. Application dates, September 16 and December 9, 1921.

Specification No. 185,242 (See THE CHEMICAL AGE, Vol. VII, p. 503) describes a process for treating oxidised copper ores by hydro-metallurgical methods for the recovery of the metal. In this invention, the process is developed to cover the treatment of ores containing non-oxidised compounds such as the sulphide, with or without arsenides, antimonides, or phosphorus compounds of copper. The ore is crushed and roasted for one to three hours at a temperature of 350°–500° C., to convert the sulphides of copper and iron into sulphates. The temperature is then raised to 600° C. for one to two hours to convert the sulphate of iron into oxide without affecting the copper sulphate. The reduced ore is then treated, without cooling, in a reducing gas at a temperature of 300°–400° C., which reduces the copper compounds to a porous state in which they are more readily dissolved in an ammoniacal solvent containing carbon dioxide in the presence of air or oxygen. This solution is boiled for the recovery of copper and ammonia, but only the copper present as ammonium copper carbonate is precipitated. Any copper which is present as ammonium copper sulphate is not precipitated unless the equivalent of a caustic carbonated alkali is added before or during the expulsion of the ammonia. An example is given of the application of the process to a South African ore containing oxygen and sulphur compounds of copper.

190,269. CELLULOSE ACETATES, TREATMENT OF. British Cellulose and Chemical Manufacturing Co., Ltd., 8, Waterloo Place, London, S.W.1. From the American Cellulose and Chemical Manufacturing Co., Ltd., 681, Fifth Avenue, New York. Application date, September 27, 1921.

In treating cellulose acetates, including the partly hydrated acetate, with glycerine, it is usually found that it is necessary to add a very large proportion of glycerine to obtain a uniform product. The product thus obtained is too soft, and sufficient glycerine cannot be removed from it. In the present process a small proportion of glycerine, e.g., 3 per cent., may be intimately mixed with the cellulose acetate. The cellulose acetate is first heated to 200°—300° F. with a large quantity of glycerine, to obtain a uniform product, and the excess of glycerine is reduced by washing until the required percentage remains. The water is then eliminated by evaporation. In a modification, the proportion of glycerine may be more accurately adjusted by continuing the washing to remove as much glycerine as possible, and then adding a glycerine and water mixture containing the required amount of glycerine. The water is then evaporated off. It is found that a mixture of cellulose acetate with about 3—3.5 per cent. of glycerine is plastic under heat and pressure, and may be moulded at about 400° F. in the same manner as celluloid.

190,284. CRACKING AND HYDROGENATING HYDROCARBONS. G. F. Forwood, Mark Lane Station Buildings, London, E.C.3, and J. G. Taplay, 45, Sternhold Avenue, Streatham Hill, London, S.W.2. Application date, October 7, 1921.

The process is for converting high boiling hydrocarbons into hydrocarbons of low boiling point and high hydrogen saturation, by passing the vapour mixed with steam over carbon heated to a temperature at which steam is decomposed, liberating hydrogen which hydrogenates the oil. The carbon is derived from carbonaceous shale, or wood, peat or other vegetable or animal matter, and is heated in a retort into which steam and oil are admitted at different points so as to mix within the retort. In some cases, the oil is cracked in the presence of steam and simultaneously hydrogenated. The gaseous products are passed into condensers and scrubbers, and the permanent gases, which contain a considerable proportion of hydrogen, are freed from carbon dioxide and sulphuretted hydrogen and returned to the retort. It is found that the permanent gas prevents excessive decomposition of the oil vapour, and a more effective hydrogenation of the oil is obtained due to the large proportion of hydrogen. Less steam is also required—so that the consumption of fuel is decreased. If oil fractions distilling below 180° C. are treated, the carbon in the retort is gradually used up in the reaction, but if heavy oil fractions boiling between 180° and 325° C. are treated, an excess of carbon is deposited and must be removed periodically. If low boiling and high boiling oils are treated alternately, the quantity of carbon in the retort may be kept practically constant, so that cooling of the retort for its removal or addition is avoided.

190,286. WATER-SOLUBLE COMPOUNDS OF DIETHYL BARBITURIC ACID AND PHENYL-ETHYL BARBITURIC ACID. PROCESS FOR MANUFACTURING. H. Sefton-Jones, London. From firm of J. A. Wulffing, 231, Friedrichstrasse, Berlin. Application date, October 8, 1921.

Sodium diethyl barbiturate when used as a drug has been mixed with salts of acetyl salicylic acid, but it is found that such a mixture decomposes and becomes hygroscopic due to the sodium acetyl salicylate, which is easily decomposed. In the present invention this is obviated by the use of new salts of C<sup>1</sup>C-diethyl barbituric acid formed by combination with the alkaline earths. These salts cannot be produced by the use of freshly precipitated calcium carbonate or crystallised magnesium carbonate and diethyl barbituric acid. If freshly precipitated magnesium carbonate is used, the mixture reacts yielding magnesium diethyl barbiturate, which may be concentrated by evaporation *in vacuo* yielding a salt containing about 6 per cent. of magnesium. The salt may also be produced with magnesium hydroxide, and a similar salt with calcium hydroxide. Soluble salts may similarly be obtained from C<sup>1</sup>C-phenyl-ethyl barbituric acid.

190,313. DYEING CELLULOSE ACETATES. Burgess, Ledward and Co., Ltd., Wardley Mills, Walkden, Lancs. and W. Harrison, Beechwood, Walkden Road, Worsley, Lancs. Application date, October 27, 1921.

The object is to dye cellulose triacetate and other cellulose acetates from pale to dark shades without the use of excess of dye stuffs. The dye stuffs employed are compounds containing the azo group associated with one or more alkyl amido groups, but not containing sulphonic or carboxylic groups attached directly to carbon atoms in the rings of cyclic compounds. These compounds are produced by treating compounds containing amido groups with or without other groups such as nitro, chloro, hydroxyl, methyl, methoxyl, methylamido, or dimethyl amido groups, with acid and sodium nitrite. The resulting diazo compound in acetic acid solution is coupled with alkyl-amido compounds. Dyestuffs of this class are obtained from diazotised mono-amido compounds such as anilines, chlor-anilines, nitranilines, nitro-anisidines, amido-methyl anilines, amido-dimethyl-aniline, naphthylamines, amido-azo-benzenes, etc., coupled with mono-methyl-aniline, dimethyl-aniline, etc. Suitable dyestuffs may also be obtained from diazotised diamido compounds such as benzidine, dianisidine, diamido-diphenyl-methane, etc., coupled with the above coupling agents. Reference is directed in pursuance of Section 8, Sub-section 2, of the Patents and Designs Acts of 1907 and 1919, to Specification No. 182,836. (See THE CHEMICAL AGE, Vol. VII, p. 246.)

190,314. SUGAR, PROCESS FOR THE EXTRACTION OF, AND PURIFICATION OF SUGAR SOLUTIONS. Plauson's (Parent Co.), Ltd., 17, Waterloo Place, Pall Mall, London, S.W.1. From H. Plauson, 14, Huxter, Hamburg, Germany. Application date October 28, 1921.

In the usual method of extracting sugar from beet by diffusion, the plant is expensive and the operation is not performed automatically or continuously. In the pressing process for the extraction of sugar, the consumption of power is high. In the present process, beet is mixed with cold or warm water, and treated in the colloid mill described in Specification No. 155,836 (see THE CHEMICAL AGE, Vol. IV, p. 313) for one to two minutes, by which the sugar is completely extracted. Milk of lime is then added up to 1 per cent., and the treatment continued for half to one minute. The mixture is then saturated with carbon dioxide, and then filtered at high pressure in an ultra filter press such as that described in Specification No. 155,834 or 181,023 (see THE CHEMICAL AGE, Vol. IV, p. 313, and Vol. VII, p. 178). A clear syrup is continuously obtained, and may be crystallised in the usual manner. Examples are given of the large scale manufacture of sugar by this process, and of its further purification by treatment with decolorising carbon or fuller's earth.

190,390. ALKALI METAL CYANIDES, PROCESS FOR THE SYNTHETIC PRODUCTION OF. F. von Bichowsky, 1412, San Fernando Boulevard, Glendale, Cal., U.S.A. Application date, February 22, 1922.

The process is for producing alkali cyanides by heating together a nitride, carbo-nitride or cyano-nitride, an oxide or salt of an alkali metal, and a carbon compound such as a carbide. The nitrides used are those formed from any metal which combines directly or indirectly with nitrogen, such as aluminium silicon, chromium, iron, lithium, magnesium, zirconium, titanium, niobium, tungsten, vanadium, molybdenum, zinc, barium, calcium, boron. The carbides used are preferably those of the alkaline earths, and also those of tungsten, aluminium, barium, and manganese. The oxygen-alkali compound is preferably an oxide, hydroxide, or carbonate; chlorates or sulphur compounds such as sulphates would yield cyanates or sulphocyanides and cannot be used. When stable nitrides are used together with a flux, the temperature may be 800° C., which avoids the decomposition of the cyanides liable at higher temperatures. The reaction may be facilitated by the addition of iron, magnesium, calcium or alkali metal chlorides, if these are not present as impurities. In an example, a mixture of titanium nitride 5 parts, anhydrous sodium carbonate 4 parts, and calcium carbide 1 part is fused at 950° C., giving a theoretical yield of cyanide. The cyanide is extracted with water and crystallised. Another example is given in which a mixture of silicon nitride, anhydrous sodium carbonate and carborundum powder, together with sodium chloride as a flux, is used.

### International Specifications not yet Accepted

188,629. COLLOIDAL SULPHUR LUBRICANT. Keystone Oil and Manufacturing Co., 111, North Market Street, Chicago. Assignees of H. C. Clafin, 12,369, Euclid Avenue, Cleveland, Ohio, U.S.A. International Convention date, November 5, 1921.

Five pounds of finely divided sulphur are mixed with one quart of refined cylinder oil to form a paste, and the mixture is added slowly to 10 gals. of the oil, which is heated to about 220° C. This mixture is then added slowly to 20 gals. of cold paraffin oil of 34° Bé. in a water-jacketed mixer. The product is suitable for lubricating purposes.

188,632. DYEING WOOL. Akt.-Ges. für Anilin Fabrikation, Treptow, Berlin. International Convention date, November 7, 1921.

In dyeing wool with chrome dyestuffs, the dye-bath or the after-treatment bath containing the chromium compound is mixed with sulphite cellulose waste liquor, ligninsulphonates, cell-pitch, or sugars, particularly pentoses or hexoses. Deterioration of the wool caused by chromium compounds is thereby avoided. Examples are given.

188,634. SODIUM NITRATE. Guggenheim Bros., 120, Broadway, Manhattan, New York. Assignees of C. L. Burdick, 120, Broadway, Manhattan, New York. International Convention date, November 7, 1921.

The process is for improving the yield of sodium nitrate obtained from caliche. It is found that the formation of double sodium nitrate-sodium sulphate is prevented by the addition of other salts which have a greater affinity in forming double salts with the sodium sulphate such as magnesium sulphate, calcium sulphate, syngenite (calcium-potassium sulphate) and astrakanite (magnesium sodium sulphate). If the caliche contains glauberite (calcium sodium sulphate) this substance will produce the desired effect, or such caliche may be added to other caliche which does not contain glauberite. The caliche is leached at temperatures up to 58° C. and the nitrate crystallised out at 7° C. The crystallisation temperature must be such that the sodium sulphate does not crystallise.

188,651. AMMONIA SYNTHESIS. Nitrogen Corporation, 55, Canal Street, Providence, R.I., U.S.A. Assignees of E. H. Arnold, Coventry, R.I., U.S.A., and W. T. Wakeford, Providence, R.I., U.S.A. International Convention date, November 9, 1921.

An autoclave for the synthesis of ammonia is provided with a neck of smaller diameter at each end, screwed externally. A screwed cap fits over each neck, and carries a screwed stud which is adapted to force a flat closure plate on to the opening of the autoclave. Annular V-grooves are formed in the plate and its seating to receive a ring of packing material of metal or asbestos. The parts are preferably constructed of steel or vanadium steel alloy, and the joints are capable of withstanding high temperature and pressure.

188,656-7. EXTRACTING METALS FROM ORES AS VOLATILE CHLORIDES. S. J. Vermaes, 170, Oude Delft, Delft, Holland, and L. L. J. van Lijnden, 16, Nassau Dillenburgstraat, The Hague, Holland. International Convention date, November 12, 1921.

188,656.—Oxidised copper ore or roasted sulphide ore is heated in a furnace under oxidising conditions to a temperature suitable for chloridising. The ore is then transferred to another furnace, mixed with calcium chloride, and heated to volatilise the chlorides. The chloridising furnace may be heated indirectly or by a limited amount of gas within it to 820° C., and the volatilised chlorides are removed by a counter-current of air or combustion gas. The furnace may be rotated to agitate the charge, or by forcing gas through the ore. The chloridising furnace may be heated by helical combustion flues in the wall at the inlet end for the ore only, and the chloridised ore is cooled at the discharge end by the incoming counter-current of air or gas.

188,657.—Metallic chloride vapour is reduced by passing it over a mixture of carbon and alkalis, alkaline earths or magnesia heated to such a temperature that the metal and the alkali chloride may both be discharged in a molten condition. A mixture of carbonaceous fuel and burnt or unburnt limestone or dolomite is suitable for reducing the chloride vapour, or the vapour may be mixed with a gaseous or liquid reducing agent and passed over the heated alkali.

### LATEST NOTIFICATIONS

191,357. Process for obtaining and cleaning cellulose from wood and similar substances containing cellulose. Schmidt, E. January 4, 1922.

191,363. Process for manufacturing dioxypylene. Pereira, H. January 7, 1922.

### Specifications Accepted, with Date of Application

170,571. Electrolytic iron, Production of. Soc. le Fer. October 19, 1920.

171,693. Tanning, Process of—and manufacture of agents therefor. Gerb- und Farbstoffwerke H. Renner and Co. Akt.-Ges. November 15, 1920.

173,780. Electrolytic mercuric oxide, Process for improving. Elektrizitätswerk Lanza. January 8, 1921.

176,319. Metaldehyde, Manufacture or production of. Elektrizitätswerk Lanza. March 3, 1921.

179,947. Argon from atmospheric air, Process and apparatus for obtaining. M. Zack. May 11, 1921.

180,326. Aluminium, Electrolytic production of. M. Blasi. May 18, 1921.

190,732. Acetylated cellulose, and products derived therefrom, such as artificial silk, horsehair, films and the like, Process for the manufacture of. J. O. Zdanowich. June 20, 1921.

190,733. Lead oxide, Apparatus for the manufacture of. G. V. Barton and Lead Products Syndicate, Ltd. June 22, 1921.

190,751. Light hydrocarbons from heavy hydrocarbons, Process for the production of. C. R. Burke. August 22, 1921.

190,754. Hydrocarbon oils and tars, Process of treating. A. B. Foster. August 23, 1921.

190,772. Viscose silk, Manufacture of. E. Bronnert. September 20, 1921. Addition to 170,024.

190,819. Carbonaceous materials, Apparatus for the distillation of. T. W. S. Hutchins. October 1, 1921.

190,844. 1:3-dinitro-4:5-dinitrosobenzene, Process for the manufacture of salts of. H. Rathsburg. October 20, 1921.

190,891. Metaldehyde, Manufacture or production of—and the obtaining of fuel bodies therefrom. J. Y. Johnson (Elektrizitätswerk Lanza). December 6, 1921.

190,923. Separation of gaseous mixtures, Process and apparatus for. E. C. R. Marks. (Linde Air Products Co.) January 9, 1922.

190,924. Electrolytic cells. A. E. Knowles. January 12, 1922.

190,941. Grinding or crushing apparatus. F. S. Behneman and H. S. Rexworthy. February 14, 1922.

190,955. Lead oxide, Apparatus for the manufacture of. G. V. Barton and Lead Products Syndicate, Ltd. June 22, 1921.

190,956. Depositing and conveying light substances carried in suspension in effluent and other gases, Apparatus for. G. V. Barton and Lead Products Syndicate, Ltd. June 22, 1921.

190,961. Hydrocyanic acid from gases, Method of recovering. M. E. Mueller. April 10, 1922.

### Applications for Patents

Ashcroft, E. A. Electrolysing fused salts of metals and recovering the metals and acid radicals. 1,007. January 11.

Ashcroft, E. A. Metallurgical treatment of sulphide ores, etc., containing lead and/or zinc, etc. 1,147. January 12.

Blagden, J. W., and Howard and Sons, Ltd. Making synthetic menthol. 1,124. January 12.

British Dyestuffs Corporation, Ltd., Frank, G. H., Green, A. G., and Saunders, K. H. Manufacture of azo dye-stuffs. 1,223. January 13.

Chemical and Metallurgical Corporation, Ltd., and Elmore, F. E. Acid-resisting tanks, etc. 901. January 10.

Cowburn, A. W. Production of concentrated sulphuric acid. 836. January 10.

Dreyfus, H. Manufacture of cellulose derivatives. 1,028. January 11.

Edwards, H., and Young, G. Process for obtaining oils from shales, etc. 714. January 9.

Industrial Research, Ltd. Recovery of ammonia from gases. 910. January 10. (Germany, January 10, 1922.)

Marks, E. C. R., and U.S. Industrial Alcohol Co. Process of obtaining alcohol, etc. 1,022, 1,024. January 11.

Marks, E. C. R., and U.S. Industrial Alcohol Co. Apparatus for obtaining alcohol, etc. 1,023, 1,025. January 11.

National Aniline and Chemical Co., Inc. Alkylation of carbazole. 1,091. January 12. (United States, January 25, 1922.)

Roucka, E. Apparatus for measuring and transmitting values of physical or chemical quantities. 733. January 9. (Czechoslovakia, January 10, 1922.)

Roucka, E. Arrangement for measuring variable physical or chemical values from a distance. 734, 735. January 9. (Czechoslovakia, January 11, 1922.)

Special Chemicals Co. and Wade, H. Manufacture of dentifrices. 1,048. January 11.



## Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co., Ltd., and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.

London, January 18, 1923.

THE past week has witnessed a marked increase in activity, and quite a substantial volume of business on home trade requirements has been placed. Prices tend upwards.

The export demand is maintained, and the outlook in that direction is better than it has been for some time.

### General Chemicals

**ACETONE.**—There are practically no stocks, and as manufacturers are well sold ahead the position is remarkably firm.

**ACID ACETIC** is again firmer in price. The second-hand sellers who have been spoiling the market are being gradually eliminated.

**ACID CITRIC** is higher in price, and a further advance is expected as the season approaches.

**ACID FORMIC.**—The demand is rather slow, but price is maintained.

**ACID LACTIC** is unchanged.

**ACID OXALIC** is in fair demand without change in value.

**ACID TARTARIC** is rather firmer, but demand is still far from good.

**ARSENIC.**—Makers unchanged, but in some quarters price is thought to have reached maximum, and an easier tendency is looked for.

**BARIUM CHLORIDE** is quiet and uninteresting.

**CREAM OF TARTAR.**—Many foreign makers decline to follow present prices, which appear to be too low.

**COPPER SULPHATE** is without special feature.

**FORMALDEHYDE** is becoming scarcer, and buyers will shortly have to pay a price based upon the present value of raw materials.

**LEAD ACETATE** is in fair demand, price unchanged.

**METHYL ALCOHOL** is very scarce in all positions, and seems likely to advance further.

**POTASSIUM CARBONATE** remains unchanged.

**POTASSIUM CAUSTIC** is rather weaker again on foreign offering. The demand is still very small.

**POTASSIUM PERMANGANATE** is in fair demand. Price is firmer.

**POTASSIUM PRUSSATE.**—Makers are well sold. Price seems likely to go higher.

**SODIUM ACETATE.**—There is no change in value. The tendency is strong, and arrivals pass promptly into consumption.

**SODIUM HYPOSULPHITE** is unchanged.

**SODIUM NITRITE.**—A little more business is reported. There is no alteration in price.

**SODIUM PRUSSATE.**—The demand is rather slow at the moment.

### Pharmaceutical Chemicals

**ACETYL SALICYLIC ACID** has continued in steady demand at last prices.

**ACID SALICYLIC B.P.**—The cheaper second-hand parcels are being rapidly absorbed.

**ARBITONE** is very firm and may be expected to advance.

**BROMIDES.**—There are still a few cheap parcels of potassium offering on the spot. Values should in due course adjust themselves in accordance with the higher quotations made by makers.

**COCAIN.**—Prices are well maintained, and a fair business is reported.

**HEXAMINE** is in active demand, and considerable business has been transacted on a rising market.

**PARALDEHYDE** is in fair request. Price well maintained.

**SODA SALICYLATE** is firm both in first and second hands.

**THYMOL** is slightly easier owing to moderate demand.

**VANILLIN** is weaker, lower prices being quoted by makers.

### Coal Tar Intermediates

Business during the past week has been slightly more interesting, but no very general expansion is to be expected for the present.

**ALPHA NAPHTHOL** has been inquired for on export account.

**ALPHA NAPHTHYLAMINE** is quiet and easy.

**ANILINE OIL AND SALT** are slightly easier.

**BENZIDINE BASE.**—Some orders have been received.

**BETA NAPHTHOL.**—Rather more inquiry is in the market.

**DIMETHYLANILINE.**—A few small orders have been placed.

**"H" ACID** has been the object of some interest.

**NITROBENZOL.**—Some small orders have been booked.

**ORTHO TOLUIDINE** has been inquired for.

**PARAPHENYLENEDIAMINE.**—A small home business.

**"R" SALT.**—Some home business is in the market.

**RESORCIN** is a fair trade for home consumption.

**SULPHANILIC ACID.**—A number of home orders have been booked.

### Coal Tar Products

The market maintains a firm tone, and the demand for most coal tar products is steady.

**90% BENZOL** is easy at about 1s. 7d. to 1s. 8d. per gallon in the North and about 1s. 11d. to 2s. per gallon in London.

**PURE BENZOL** is in rather better demand, and is quoted at 2s. to 2s. 3d. per gallon on rails in the North, and 2s. 4d. to 2s. 6d. per gallon in London.

**CREOSOTE OIL** is scarce, and is somewhat stronger. It is worth 7½d. to 7¾d. per gallon on rails in the North and from 8d. to 8¼d. per gallon in London.

**CRESYLIC ACID** remains unchanged, and the dark quality 95/97% is quoted at 1s. 9d. per gallon on rails, while the pale quality 97/99% is quoted at 1s. 11d. to 2s. per gallon.

**SOLVENT NAPHTHA** is worth about 1s. 7d. per gallon on rails in the North, while in London the price is quoted at 1s. 10d. to 2s. per gallon.

**HEAVY NAPHTHA** has a poor market, and is worth about 1s. 6d. per gallon on rails.

**CRUDE NAPHTHALENE** is steady at from £5 to £7 per ton for the crude and whizzed qualities with lower melting points, while hot pressed is worth from £9 to £9 10s. per ton.

**PITCH.**—The market remains very firm and prices still have an upward tendency. To-day's quotations are: London 140s. to 142s. 6d., East Coast 137s. 6d. to 140s., West Coast 135s. to 137s. 6d.

### Sulphate of Ammonia

The position is unchanged.

### Current Prices

#### General Chemicals

	Per	£	s.	d.	to	£	s.	d.
Acetic anhydride.....	lb.	0	1	5	to	0	1	7
Acetone oil .....	ton	85	0	0	to	87	10	0
Acetone, pure.....	ton	130	0	0	to	135	0	0
Acid, Acetic, glacial, 99-100%.....	ton	67	0	0	to	68	0	0
Acetic, 80% pure.....	ton	45	0	0	to	46	0	0
Arsenic, liquid, 2000 s.g.....	ton	67	0	0	to	70	0	0
Boric, cryst. ....	ton	55	0	0	to	60	0	0
Carbolic, cryst. 39-40%.....	lb.	0	7	to	0	0	7½	
Citric .....	lb.	0	1	9	to	0	1	10
Formic, 80%.....	ton	51	0	0	to	53	0	0
Hydrofluoric.....	lb.	0	0	7½	to	0	0	8½
Lactic, 50 vol.....	ton	41	0	0	to	43	0	0
Lactic, 60 vol.....	ton	43	0	0	to	44	0	0
Nitric, 80 Tw.....	ton	27	0	0	to	29	0	0
Oxalic .....	lb.	0	0	7	to	0	0	7½
Phosphoric, 1.5.....	ton	40	0	0	to	42	0	0
Pyrogallie, cryst. ....	lb.	0	5	9	to	0	6	0
Salicylic, Technical .....	lb.	0	1	1	to	0	1	3
Sulphuric, 92-93%.....	ton	6	10	0	to	7	10	0
Tannic, commercial.....	lb.	0	2	3	to	0	2	9
Tartaric.....	lb.	0	1	2½	to	0	1	3

	Per	£	s.	d.	£	s.	d.	
Alum, lump.....	ton	13	0	0	to	13	10	0
Alum, chrome.....	ton	28	0	0	to	29	0	0
Alumino ferric.....	ton	9	0	0	to	9	5	0
Aluminium, sulphate, 14-15%.....	ton	10	10	0	to	11	0	0
Aluminium, sulphate, 17-18%.....	ton	11	10	0	to	12	0	0
Ammonia, anhydrous.....	lb.	0	1	6	to	0	1	8
Ammonia, .880.....	ton	33	0	0	to	35	0	0
Ammonia, .920.....	ton	21	0	0	to	23	0	0
Ammonia, carbonate.....	lb.	0	0	4	to	0	0	4½
Ammonia, chloride.....	ton	50	0	0	to	55	0	0
Ammonia, muriate (galvanisers).....	ton	35	0	0	to	37	10	0
Ammonia, nitrate (pure).....	ton	35	0	0	to	40	0	0
Ammonia, phosphate.....	ton	65	0	0	to	68	0	0
Ammonia, sulphocyanide.....	lb.	0	1	10	to	0	2	0
Amyl acetate.....	ton	175	0	0	to	185	0	0
Arsenic, white, powdered.....	ton	70	0	0	to	75	0	0
Barium, carbonate, 92-94%.....	ton	55	0	0	to	66	0	0
Barium, Chlorate.....	ton	65	0	0	to	70	0	0
Barium Chloride.....	ton	17	10	0	to	18	0	0
Nitrate.....	ton	31	0	0	to	33	0	0
Sulphate, blanc fixe, dry.....	ton	20	10	0	to	21	0	0
Sulphate, blanc fixe, pulp.....	ton	10	5	0	to	10	10	0
Sulphocyanide, 95%.....	lb.	0	1	0	to	0	1	3
Bleaching powder, 35-37%.....	ton	11	0	0	to	—	—	—
Borax crystals.....	ton	28	0	0	to	32	0	0
Calcium acetate, Brown.....	ton	12	10	0	to	13	10	0
Grey.....	ton	17	10	0	to	18	0	0
Calcium Carbide.....	ton	16	0	0	to	17	0	0
Chloride.....	ton	6	0	0	to	7	0	0
Carbon bisulphide.....	ton	50	0	0	to	52	0	0
Casein technical.....	ton	98	0	0	to	105	0	0
Cerium oxalate.....	lb.	0	3	0	to	0	3	6
Chromium acetate.....	lb.	0	1	1	to	0	1	3
Cobalt acetate.....	lb.	0	6	0	to	0	6	6
Oxide, black.....	lb.	0	9	6	to	0	10	0
Copper chloride.....	lb.	0	1	2	to	0	1	3
Sulphate.....	ton	27	10	0	to	28	10	0
Cream Tartar, 98-100%.....	ton	95	0	0	to	97	10	0
Epsom salts (see Magnesium sulphate)								
Formaldehyde, 40% vol.....	ton	90	0	0	to	95	0	0
Formosol (Rongalite).....	lb.	0	2	6	to	0	2	9
Glauber salts, commercial.....	ton	5	0	0	to	5	10	0
Glycerin, crude.....	ton	65	0	0	to	67	10	0
Hydrogen peroxide, 12 vols.....	gal.	0	2	3	to	0	2	4
Iron perchloride.....	ton	30	0	0	to	32	0	0
Iron sulphate (Copperas).....	ton	3	10	0	to	4	0	0
Lead acetate, white.....	ton	41	0	0	to	43	0	0
Carbonate (White Lead).....	ton	42	0	0	to	47	0	0
Nitrate.....	ton	44	10	0	to	45	0	0
Litharge.....	ton	35	10	0	to	36	0	0
Lithopone, 30%.....	ton	22	10	0	to	23	10	0
Magnesium chloride.....	ton	5	10	0	to	6	0	0
Carbonate, light.....	cwt.	2	10	0	to	2	15	0
Sulphate (Epsom salts com- mercial).....	ton	6	10	0	to	7	0	0
Sulphate (Druggists').....	ton	10	0	0	to	11	0	0
Manganese Borate, commercial.....	ton	65	0	0	to	75	0	0
Sulphate.....	ton	60	0	0	to	62	0	0
Methyl acetone.....	ton	70	0	0	to	75	0	0
Alcohol, 1% acetone.....	ton	105	0	0	to	110	0	0
Nickel sulphate, single salt.....	ton	45	0	0	to	46	0	0
Ammonium sulphate, double salt.....	ton	45	0	0	to	46	0	0
Potash, Caustic.....	ton	32	0	0	to	33	0	0
Potassium bichromate.....	lb.	0	0	6	to	0	0	6½
Carbonate, 90%.....	ton	31	0	0	to	33	0	0
Chloride, 80%.....	ton	12	0	0	to	12	10	0
Chlorate.....	lb.	0	0	4½	to	0	0	5
Metabisulphite, 50-52%.....	ton	84	0	0	to	90	0	0
Nitrate, refined.....	ton	43	0	0	to	45	0	0
Permanganate.....	lb.	0	0	9	to	0	0	9½
Prussiate, red.....	lb.	0	4	3	to	0	4	6
Prussiate, yellow.....	lb.	0	1	6½	to	0	1	7½
Sulphate, 90%.....	ton	13	0	0	to	13	10	0
Salammoniac, firsts.....	cwt.	3	3	0	to	—	—	—
Seconds.....	cwt.	3	0	0	to	—	—	—
Sodium acetate.....	ton	24	10	0	to	24	15	0
Arsenate, 45%.....	ton	45	0	0	to	48	0	0
Bicarbonate.....	ton	10	10	0	to	11	0	0
Bichromate.....	lb.	0	0	4½	to	0	0	4½
Bisulphite 60-62%.....	ton	21	0	0	to	23	0	0
Chlorate.....	lb.	0	0	3½	to	0	0	4
Caustic, 70%.....	ton	19	10	0	to	20	0	0
Caustic, 76%.....	ton	20	10	0	to	21	0	0
Hydrosulphite, powder, 85%.....	lb.	0	1	7	to	0	1	9
Hyposulphite, commercial.....	ton	10	10	0	to	11	0	0
Nitrite, 96-98%.....	ton	29	10	0	to	30	0	0
Phosphate, crystal.....	ton	16	0	0	to	16	10	0
Perborate.....	lb.	0	0	11	to	0	1	0

	Per	£	s.	d.		£	s.	d.
Sodium Prussiate.....	lb.	0	0	10½	to	0	0	11
Sulphide, crystals.....	ton	10	10	0	to	11	0	0
Sulphide, solid, 60-62%.....	ton	16	10	0	to	17	10	0
Sulphite, cryst.....	ton	12	10	0	to	13	0	0
Strontium carbonate.....	ton	55	0	0	to	60	0	0
Strontium Nitrate.....	ton	40	0	0	to	42	0	0
Strontium Sulphate, white.....	ton	6	10	0	to	7	10	0
Sulphur chloride.....	ton	25	0	0	to	27	10	0
Sulphur, Flowers.....	ton	11	0	0	to	12	0	0
Roll.....	ton	11	0	0	to	12	0	0
Tartar emetic.....	lb.	0	1	3	to	0	1	4
Theobromine.....	lb.	0	12	6	to	0	13	0
Tin perchloride, 33%.....	lb.	0	1	2	to	0	1	4
Perchloride, solid.....	lb.	0	1	5	to	0	1	7
Protochloride (tin crystals).....	lb.	0	1	5	to	0	1	6
Zinc chloride 102° Tw.....	ton	21	0	0	to	22	10	0
Chloride, solid, 96-98%.....	ton	25	0	0	to	30	0	0
Oxide, 99%.....	ton	37	0	0	to	38	0	0
Dust, 90%.....	ton	45	0	0	to	47	10	0
Sulphate.....	ton	16	10	0	to	17	10	0

## Pharmaceutical Chemicals

Acetyl salicylic acid.....	lb.	0	2	10	to	0	3	0
Acetanilid.....	lb.	0	1	4	to	0	1	6
Acid, Gallic, pure.....	lb.	0	3	0	to	0	3	3
Lactic, 1.21.....	lb.	0	2	9	to	0	3	0
Salicylic, B.P.....	lb.	0	1	5	to	0	1	7
Tannic, lewiss.....	lb.	0	3	4	to	0	3	6
Amidol.....	lb.	0	8	6	to	0	8	9
Amidopyrin.....	lb.	0	14	6	to	0	15	0
Ammon ichthosulphonate.....	lb.	0	2	0	to	0	2	3
Barbitone.....	lb.	0	12	6	to	0	13	6
Beta naphthol resublimed.....	lb.	0	1	9	to	0	2	0
Bromide of ammonia.....	lb.	0	0	8½	to	0	0	9
Potash.....	lb.	0	0	7½	to	0	0	8
Soda.....	lb.	0	0	8	to	0	0	8½
Caffeine, pure.....	lb.	0	12	0	to	0	12	3
Calcium glycerophosphate.....	lb.	0	5	6	to	0	6	0
Calcium lactate.....	lb.	0	2	0	to	0	2	3
Calomel.....	lb.	0	4	9	to	0	5	0
Chloral hydrate.....	lb.	0	4	3	to	0	4	6
Cocaine alkaloid.....	oz.	0	18	6	to	0	19	0
Cocain hydrochloride.....	oz.	0	15	0	to	0	15	6
Corrosive sublimate.....	lb.	0	4	6	to	0	4	9
Eucalyptus oil, B.P. (70-75% eucalyptol)								
B.P. (75-80% eucalyptol).....	lb.	0	1	7	to	0	1	7½
Guaiacol carbonate.....	lb.	0	8	0	to	0	8	3
Liquid.....	lb.	0	9	0	to	0	9	6
Pure crystals.....	lb.	0	10	0	to	0	10	6
Hexamine.....	lb.	0	3	3	to	0	3	6
Hydroquinone.....	lb.	0	3	3	to	0	3	6
Lanoline anhydrous.....	lb.	0	0	7½	to	0	0	8
Lecithin ex ovo.....	lb.	0	18	6	to	0	19	0
Lithia carbonate.....	lb.	0	9	9	to	0	10	3
Methyl salicylate.....	lb.	0	2	0	to	0	2	3
Metol.....	lb.	0	10	0	to	0	10	6
Milk sugar.....	cwt.	4	17	6	to	5	2	6
Paraldehyde.....	lb.	0	1	4	to	0	1	6
Phenacetin.....	lb.	0	4	10	to	0	5	0
Phenazone.....	lb.	0	6	9	to	0	7	0
Phenolphthalein.....	lb.	0	5	0	to	0	5	3
Potassium sulpho guaiacolate.....	lb.	0	5	0	to	0	5	3
Quinine sulphate, B.P.....	oz.	0	2	3	to	—	—	—
Resorcin, medicinal.....	lb.	0	5	6	to	0	5	9
Salicylate of soda powder.....	lb.	0	1	10	to	0	2	0
Crystals.....	lb.	0	2	0	to	0	2	3
Salol.....	lb.	0	2	3	to	0	2	6
Soda Benzoate.....	lb.	0	2	0	to	0	2	3
Sulphonol.....	lb.	0	13	6	to	0	14	0
Terpene hydrate.....	lb.	0	1	9	to	0	2	0
Theobromine, pure.....	lb.	0	12	0	to	0	12	6
soda salicylate.....	lb.	0	8	6	to	0	9	0
Vanillin.....	lb.	1	2	6	to	1	3	6

## Coal Tar Intermediates, &amp;c.

Alphanaphthol, crude.....	lb.	0	2	0	to	0	2	3
Alphanaphthol, refined.....	lb.	0	2	6	to	0	2	9
Alphanaphthylamine.....	lb.	0	1	7	to	0	1	8
Aniline oil, drums extra.....	lb.	0	0	9½	to	0	0	10
Aniline salts.....	lb.	0	0	9½	to	0	0	10
Anthracene, 40-50%.....	unit	0	0	8½	to	0	0	9
Benzaldehyde (free of chlorine).....	lb.	0	3	0	to	0	3	3
Benidine, base.....	lb.	0	5	0	to	0	5	3
Benidine, sulphate.....	lb.	0	4	0	to	0	4	3
Benzoic acid.....	lb.	0	2	0	to	0	2	3
Benzyl chloride, technical.....	lb.	0	2	0	to	0	2	3

	Per	£	s.	d.	£	s.	d.	
Betanaphthol .....	lb.	0	1	2½	to	0	1	3
Betanaphthylamine, technical .....	lb.	0	4	0	to	0	4	3
Croceine Acid, 100% basis .....	lb.	0	3	3	to	0	3	6
Dichlorbenzol .....	lb.	0	0	9	to	0	0	10
Diethylaniline .....	lb.	0	4	6	to	0	4	9
Dinitrobenzol .....	lb.	0	1	1	to	0	1	2
Dinitrochlorbenzol .....	lb.	0	0	11	to	0	1	0
Dinitronaphthalene .....	lb.	0	1	4	to	0	1	5
Dinitrotoluol .....	lb.	0	1	4	to	0	1	5
Dinitrophenol .....	lb.	0	1	7	to	0	1	9
Dimethylaniline .....	lb.	0	2	6	to	0	2	9
Diphenylamine .....	lb.	0	4	0	to	0	4	3
H-Acid .....	lb.	0	5	0	to	0	5	3
Metaphenylenediamine .....	lb.	0	4	3	to	0	4	6
Monochlorbenzol .....	lb.	0	0	10	to	0	1	0
Metanilic Acid .....	lb.	0	5	9	to	0	6	0
Metatoluylenediamine .....	lb.	0	4	3	to	0	4	6
Monosulphonic Acid (2.7) .....	lb.	0	5	6	to	0	6	0
Naphthionic acid, crude .....	lb.	0	2	3	to	0	2	6
Naphthionate of Soda .....	lb.	0	2	6	to	0	2	9
Naphthylamin-di-sulphonic acid .....	lb.	0	4	0	to	0	4	3
Neville Winther Acid .....	lb.	0	7	9	to	0	8	0
Nitrobenzol .....	lb.	0	0	8½	to	0	0	9
Nitronaphthalene .....	lb.	0	1	0	to	0	1	1
Nitrotoluol .....	lb.	0	1	0	to	0	1	1
Orthoamidophenol, base .....	lb.	0	12	0	to	0	12	6
Orthodichlorbenzol .....	lb.	0	1	0	to	0	1	1
Orthotoluidine .....	lb.	0	1	0	to	0	1	1
Orthonitrotoluol .....	lb.	0	0	5	to	0	0	6
Para-amidophenol, base .....	lb.	0	8	6	to	0	9	0
Para-amidophenol, hydrochlor .....	lb.	0	7	6	to	0	8	0
Paradichlorbenzol .....	lb.	0	0	6	to	0	0	7
Paranitraniline .....	lb.	0	3	0	to	0	3	3
Paranitrophenol .....	lb.	0	2	3	to	0	2	6
Paranitrotoluol .....	lb.	0	5	0	to	0	5	3
Paraphenylenediamine, distilled .....	lb.	0	11	6	to	0	11	9
Paratoluidine .....	lb.	0	5	9	to	0	6	3
Phthalic anhydride .....	lb.	0	2	6	to	0	2	9
Resorcin, technical .....	lb.	0	4	0	to	0	4	3
Sulphanilic acid, crude .....	lb.	0	0	11	to	0	1	0
Tolidine, base .....	lb.	0	7	3	to	0	7	9
Tolidine, mixture .....	lb.	0	2	6	to	0	2	9

## Essential Oils and Synthetics

ESSENTIAL OILS		£	s.	d.
Anise.....	c.i.f. 1/10½, spot weak	0	2	2
Bay .....	firm	0	0	11
Bergamot .....	weak	0	11	6
Cajuput .....	0	3	9	
Camphor white .....	per cwt.	4	0	0
Camphor brown .....	18	0		
Cassia .....	c.i.f. 6/9, spot easier	0	8	6
Cedarwood .....	in cases	0	1	6
Citronella (Ceylon) .....	very firm	0	2	6
Citronella (Java) .....	very firm	0	3	4
Clove .....	very firm	0	6	9
Eucalyptus .....	quiet	0	1	6
Geranium Bourbon .....	1	4	0	
Lavender .....	14	0		
Lavender spike .....	0	3	3	
Lemon .....	c.i.f.	0	2	7
Lemongrass .....	per oz.	0	0	2½
Lime (distilled) .....	very firm	0	2	6
Mint (dementholised Japanese) .....	easier	0	7	6
Orange Sweet (Sicilian) .....	dull	0	8	0
Orange Sweet (West Indian) .....	dull	0	8	6
Palmarosa .....	firm	0	17	6
Peppermint (American) .....	13	6		
Patchouli .....	12	0		
Otto of Rose .....	dull, per oz.	1	4	0
Rosemary .....	0	1	8	
Sandalwood .....	25/- to	1	6	0
Sassafras .....	0	5	0	
Thyme .....	according to quality 2/6 to	0	6	6

SYNTHETICS		£	s.	d.
Benzyl acetate .....	0	3	0	
Benzyl benzoate .....	0	3	0	
Citral .....	0	10	0	
Coumarine .....	0	11	0	
Heliotropine .....	0	5	6	
Ionone .....	1	7	0	
Linalyl acetate .....	1	2	6	
Methyl salicylate .....	0	2	0	
Musk xylol .....	0	10	0	
Terpeniol .....	0	2	10½	

## The Manchester Chemical Market

(FROM OUR OWN CORRESPONDENT.)

Manchester, January 18, 1923.

A BRIGHTER feeling generally has been experienced on the chemical market here during the past week. Buying has not been on big lines, but if it has been small it has been steady and certainly on a larger scale than during the last few weeks. The home trade section has been more active and for export, also, business has shown an improvement. It is difficult at the moment to say whether this condition will last for long in view of the political situation, but the home trade will certainly keep up while the new spell of activity in many of the consuming industries lasts.

### Heavy Chemicals

The home and export demand for caustic soda is well maintained, prices ranging from £19 per ton for 60-68 per cent. strength to £21 10s. for 76-77 per cent. Bleaching powder, also, is being taken up in good quantities and the price is firm at £11 10s. per ton. Soda crystals are improving, a better demand being experienced and prices keeping firm at £5 10s. per ton delivered. Salt-cake meets with a quiet, though steady, demand at £4 10s. per ton. Glauber salts are unchanged at £4 10s., but only a moderate inquiry is being met with. Sodium sulphide is still inactive at about £16 per ton for 60-65 per cent. concentrated. Bicarbonate of soda is unchanged at £10 10s. per ton, in 2-cwt. bags. Alkali is firm and in good home and foreign inquiry at £7 12s. 6d. per ton for 58 per cent. material. Hyposulphite of soda is a quiet section at £16 per ton for photographic crystals and £10 for commercial. Nitrite of soda is offered at £27 per ton, and a better demand is making its appearance. Phosphate of soda is dull, and the price is a shade easier at £15 10s. per ton. Chlorate of soda is active at 3d. per lb. Prussiate of soda is on the quiet side, but with supplies scarce prices are maintained at around 10d. per lb. Bichromate of soda is steady at 4½d. per lb., but little business is being put through. Acetate of soda is only in moderate demand at £33 10s. per ton.

Caustic potash meets with a better inquiry at £28 10s. per ton for 88-90 per cent. strength. Carbonate of potash is still in fairly good demand at £30 to £31 per ton for 96-98 per cent. material. Bichromate of potash has not been sought after very extensively though the price is unchanged at 6d. per lb. Yellow prussiate of potash is very firmly maintained at 1s. 6d. per lb., with red on offer at 4s. Buyers are taking up chlorate of potash in satisfactory quantities and price is firm at 3½d. per lb. Permanganate of potash is steady at 8d. per lb.

The improved export demand for sulphate of copper continues, and the quotation is firmly held at about £26 10s. Arsenic also is in steady request for shipment, as much as £75 being paid for spot lots of white powdered, Cornish makes. Commercial Epsom salts are in moderate demand at £6 per ton, with magnesium sulphate, B.P., steady at about £8. Grey acetate of lime is still in short supply at £16 per ton, with brown quoted at £8 10s. per ton. Nitrate of lead keeps quiet at about £41 10s. per ton. White sugar of lead is scarce and firm at round £38 10s., £36 being asked for brown. Ammonium muriate, grey, is in fair inquiry at £31 10s. per ton. Phosphate of ammonia is steady at £65 per ton, buyers purchasing fairly fully. Alum is quiet and unchanged at £12 per ton for loose lump.

### Acids and Tar Products

Tartaric and citric acids have been quiet for a long time, but a better tone is now reported. Prices are steady at 1s. 2d. for tartaric and 1s. 8d. per lb. for citric, B.P. crystals, but there is a firmer tendency. Acetic acid maintains its firmness; £68 is still asked for glacial and £43 per ton for 80 per cent. technical. Oxalic acid is easier at 6½d. per lb., but little business is being done. There has been no falling off in the Continental demand for pitch, and prices have been very firm at round £6 5s. per ton, f.o.b., Manchester. Carbolic acid crystals are a good market and maintain their strong position, 8½d. per lb. now being asked, with crude, 60 per cent. material, unchanged at about 2s. 6d. per gallon. Benzol is still quiet at 1s. 8d. per gallon. Solvent naphtha is also quiet but steady at 1s. 9d. to 1s. 10d. per gallon. Creosote oil still meets with a good inquiry for shipment at 7½d. to 8d. per gallon. Naphthalenes are rather dull, but prices are quite firm at up to £8 per ton for crude, £17 for flake, and £16 per ton for crystals.



## Scottish Chemical Market

The following notes on the Scottish Chemical Market are specially supplied to THE CHEMICAL AGE by Messrs. Charles Tennant and Co., Ltd., Glasgow, and may be accepted as representing the firm's independent and impartial opinions.

Glasgow, January 17, 1923.

BUSINESS during the past week has been fairly satisfactory, a good proportion of inquiries received being for export.

Prices generally are steady, with Continental quotations inclined to be higher.

### Industrial Chemicals

ACID ACETIC.—Glacial 98/100% £58 to £64 per ton; 80% technical, £42 to £44 per ton; 80% pure, £44 to £46 per ton, ex wharf.

ACID, BORACIC.—Crystal or granulated, £55 per ton; powdered £57 per ton, carriage paid U.K.

ACID, CARBOLIC ICE CRYSTALS, 39/40%.—Now quoted 8½d. to 8¾d. per lb.

ACID FORMIC, 80%.—Quoted, £54 to £56 per ton.

ACID HYDROCHLORIC.—Makers' price unchanged, 6s. 6d. per carboy, ex works.

ACID, NITRIC, 84%.—Unchanged at £27 per ton, ex station.

ACID OXALIC.—Offered at 6½d. per lb., ex wharf, duty paid.

ACID SULPHURIC.—144°, £4 per ton; 168°, £7 5s. per ton; de-arsenicated quality, £1 per ton more.

ACID TARTARIC.—Unchanged at 1s. 2d. per lb.

ALUM, LUMP POTASH.—Continental material about £12 to £12 10s. per ton. In little demand.

ALUMINA, SULPHATE, 17/18%.—Iron free. Offered at £9 10s. per ton, ex store.

AMMONIA, ANHYDROUS.—Unchanged at 1s. 6d. per lb., ex station.

AMMONIA CARBONATE.—Lump, 4d. per lb.; ground, 4½d. per lb., delivered.

AMMONIA MURIATE.—Galvanisers, grey, about £31 to £32 per ton, ex works; fine white crystals offered at £27 10s. per ton, ex store.

AMMONIA SULPHATE.—25¼%, £15 5s. per ton; 25¾%, £16 8s. per ton, ex works, January-February.

ARSENIC, WHITE POWDERED.—Now offered at £73 per ton, ex quay.

BARIUM CHLORIDE 98/100%.—Offered from Continent at £17 per ton, c.i.f. U.K.

BARYTES.—No change in English material. Price £5 5s. per ton, ex works, for finest white quality.

BLEACHING POWDER.—Spot lots £11 10s. per ton, ex station.

BORAX.—Crystal or granulated, £28 per ton; powder, £29 per ton, carriage paid U.K.

CALCIUM CHLORIDE.—English make, £5 15s. per ton, ex quay or station. Continental make about £4 10s., ex store.

COPPER SULPHATE.—Price unchanged at about £26 per ton, f.o.b. U.K.

COPPERAS, GREEN.—About £3 15s. per ton, ex store.

FORMALDEHYDE, 40%.—Moderate inquiry. Price about £89 to £91 per ton, c.i.f. U.K.

GLAUBER SALTS.—Fine white crystals offered from Continent at £3 15s. per ton, c.i.f. U.K. Spot lots, £4 per ton, ex store.

LEAD.—Red lead, £39 15s. per ton; white lead, £51 10s. per ton, carriage paid, U.K. stations. Continental red lead offered at £35 per ton, ex store.

LEAD ACETATE.—Brown, about £34 per ton, ex store; white crystals, £38 per ton.

LEAD NITRATE.—Moderate inquiry, £41 per ton, ex store.

MAGNESITE, GROUND CALCINED.—Practically no demand. Quoted £10 per ton, ex store.

MAGNESIUM CHLORIDE.—Offered from Continent at £2 18s. 6d. per ton, c.i.f. U.K. Spot lots, £3 15s. to £3 17s. 6d. per ton, ex store.

POTASSIUM BICHROMATE.—English makers' price unchanged at 6d. per lb., delivered.

POTASSIUM CARBONATE.—88/92%, offered at £27 to £28 per ton, ex store; 96/98%, £30 per ton, ex station.

POTASSIUM CAUSTIC, 88/92%.—Inclined to be dearer at £29 to £30 per ton, ex store.

POTASSIUM CHLORATE.—Crystals or powder, 3½d. per lb., ex store.

POTASSIUM MURIATE.—Continental material offered at £8 5s. per ton, c.i.f. U.K., basis 80%.

POTASSIUM PERMANGANATE.—B.P. quality, 8d. per lb., ex store.

POTASSIUM, PRUSSIAN, YELLOW.—Offered at 1s. 6d. per lb., ex station.

POTASSIUM SULPHATE, 90/92%.—Quoted £15 per ton, on basis 90%, f.o.b. U.K. port.

SODIUM ACETATE.—Price about £23 to £24 per ton, ex store.

SODIUM BICARBONATE.—Refined recrystallised quality, £10 10s. per ton, ex quay or station; m.w. quality, £1 10s. per ton less.

SODIUM BICHROMATE.—English make, 4½d. per lb., delivered.

SODIUM CARBONATE (SODA CRYSTALS).—£5 5s. to £5 10s. per ton, ex quay or station.

SODIUM, CARBONATE (ALKALI 58%).—£8 17s. 6d. per ton, ex quay or station, spot delivery.

SODIUM CAUSTIC.—76/77%, £21 10s. per ton; 70/72%, £20 per ton; 60/62%, broken £21 5s. per ton; 96/98% powdered, £24 17s. 6d. per ton, ex station, minimum 4-ton lots.

SODIUM HYPOSULPHITE.—Commercial crystals, £10 10s. per ton, ex station; pea crystals, £16 per ton, ex store.

SODIUM NITRATE, 96/98%.—Now quoted £13 per ton, f.o.r.

SODIUM NITRITE.—Quoted £27 per ton, f.o.b. U.K. port, basis 100%.

SODIUM PRUSSIAN, YELLOW.—Price about 10½d. per lb., ex station.

SODIUM SILICATE, 140°.—Moderate export inquiry. Price £10 5s. per ton, f.o.b. U.K.

SODIUM SULPHATE (SALTCAKE 95%).—Price for home consumption, £4 per ton on contract. Good inquiry for export.

SODIUM SULPHIDE.—69/62% Conc., contracts offered for British make at £16 10s. per ton, delivered. Continental make about £14 per ton, c.i.f. U.K. Crystals 30/32%, quoted £8 per ton, c.i.f.

SULPHUR.—Government surplus stocks of Sicilian thirds still available at £3 10s. to £3 15s. per ton, ex depot; flowers, £10 per ton; roll, £9 per ton; rock, £8 per ton; ground £8 per ton, all ex store.

TIN CRYSTALS.—Unchanged, 1s. 2d. per lb.

ZINC CHLORIDE.—98/100%. Continental make at £23 per ton, c.i.f. U.K.

NOTE.—The above prices are for bulk business and are not to be taken as applicable to small parcels.

### Coal Tar Intermediates and Wood Distillation Products

ALPHA NAPHTHOL.—Home inquiry. Supplies offered at 2s. 8½d. per lb., delivered.

ALPHA NAPHTHYLAMINE.—Home inquiries. Price quoted, 1s. 6½d. per lb., delivered.

BETA NAPHTHOL.—In good demand. Prices lower, at 1s. per lb.

CLEVES ACID.—Export inquiry. Price quoted, 4s. per lb. 100% basis, f.o.b.

DINITROTOLUENE.—Supplies are offered at 1s. 1d. per lb., carriage paid.

NEVILLE AND WINTHER ACID.—Export inquiry. Price quoted 6s. per lb. 100% basis.

PARANITRANILINE.—Prices inclined to be lower. Quoted at 2s. 6d. to 2s. 9d. per lb.

PARANITROCHLOROBENZOL.—Home inquiry. Price 1s. 3d. per lb., delivered.

PICRIC ACID.—Home inquiry. Price quoted, 6d. per lb., delivered.

XYLOL.—Small inquiries. Price 3s. 4d. per gallon, delivered.

### French Potash

As Spring approaches, the demand for artificial fertilisers becomes proportionately greater, and there is every indication of a brisk trade in potash. Merchants are now engaged in laying in stocks of all grades in preparation for the rush season. French kainit 14% and French sylvinite 20%-30% seem to be as popular as ever, and a good trade is being done in muriate and sulphate of potash for inclusion in compound fertilisers. Quotations for all grades remain steady at prices which are in keeping with the need for lower production costs.—Agricultural Bureau for the French Potash Mines.

## Company News

**DISTILLERS CO., LTD.**—An interim dividend of 8s. per share, free of tax, is payable on February 1.

**ANGLO-PERSIAN OIL CO., LTD.**—It is announced that the company's recent issue of 850,000 ordinary shares has been over-subscribed about twelve times.

**CANADA CEMENT CO.**—A dividend of \$1½ per share, less tax, is payable on the common stock in respect of the last quarter.

**ELLIOTT'S METAL CO.**—Interim dividends are declared at the rate of 5 per cent. per annum, less tax on the preference shares and of 1s. per share on the ordinary shares.

**NEW TAMARUGAL NITRATE CO.**—A final dividend of 10 per cent., less tax, is announced, making 15 per cent. for the year to July 31 last.

**CORDOBA COPPER CO., LTD.**—At an extraordinary general meeting on Tuesday a resolution to reduce the capital of the company from £200,000 to £80,000 was unanimously adopted.

**ANACONDA COPPER MINING CO.**—It is reported that the company has arranged to acquire control of the Chile Copper Co., subject to the approval of the shareholders. The purchase price is said to amount to over \$100,000,000.

## Chemical Trade Inquiries

*The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.*

LOCALITY OF FIRM OR AGENT.	MATERIAL.	REF. No.
Amsterdam ....	Formaldehyde, caustic soda, Epsom salts, sulphate of soda, chloride of ammonium, etc.	—
Australia .....	Aniline dyes and dry colours.	9751/ E.D./ C.C.
Egypt .....	Photographic chemicals.	9726/ F.E./ E.C.
East Africa .....	Steam still and ether plant.	10363/ E.D./ E.C.

## Fuel Symposium at Birmingham

THE Birmingham and Midland Section of the Society of Chemical Industry has arranged a fuel symposium, and at its meeting on January 23, Dr. C. H. Lander will read a paper on "Some aspects of the Fuel Problem." A contribution by Dr. A. Parker on "The Thermal Efficiencies of Manufacture of Different Grades of Gas" will also be read. The meeting will be open, and the discussion will be opened by Mr. Lamb, representing the Birmingham Metallurgical Society. Further contributions to the symposium on fuel will be made by Dr. E. W. Smith, Messrs. E. C. Evans, and R. E. Keeling at a meeting to be held on February 6. A special joint meeting of the section with the Chemical Society is announced for February 20, when Mr. S. R. Carter will communicate a paper on "Hydrogen Ion Determination."

## New Members of Dyestuffs Committee

THE Board of Trade, on the nomination of the Association of British Chemical Manufacturers have appointed Mr. W. H. Dawson, the manager of the British Alizarine Co., Ltd., Trafford Park, Manchester, to be a member of the Dyestuffs Advisory Licensing Committee, set up under Section 2 (3) of the Dyestuffs (Import Regulation) Act, 1920, in the place of Mr. E. V. Evans, F.I.C., resigned.

The Board of Trade have also appointed Mr. Lionel Blundell, of the North British Chemical Co., Ltd., Droylesden, Manchester, to be a member of the Dyestuffs Industry Development Committee, set up under Sub-section 2 (6) of the Dyestuffs (Import Regulation) Act, 1920, in the place of Mr. E. V. Evans, F.I.C., resigned.

## Dispute over Sale of Chemists' Business

A dispute over the sale of the retail chemists' and druggists' business carried on by Charles Midgley, Ltd., at 4, Exchange Street, and 90, Mosley Street, Manchester, formed the subject of an action in the Chancery Division of the High Court on Wednesday, when the vendors sued the purchasers, Taylors Drug Co., Ltd., of Burley Hill, Leeds, for failing to complete the agreement to purchase.

According to the evidence for the plaintiffs the agreement provided that £1,000 was to be paid for the goodwill, including proprietary articles, private recipes and trade marks. The book debts were to be taken on their face value and the stock in trade was to be paid for on valuation. The sum of £1,650 also was charged for the leasehold of the Exchange Street premises. The sum of £200 was to be paid down and £1,800 on defendants taking possession, the balance to be paid within 14 days after valuation, but though defendants had been in possession since July, 1921, and had paid the two sums mentioned they refused to allow the stock and fixtures to be valued.

This was denied by the defendants, who, on their part, alleged that the plaintiffs had caused delay by having old stock rewrapped so as to resemble new stock, and had transferred, from their wholesale business to the retail business, a large amount of stock which was of no use to the defendants. The defendants accordingly counter-claimed a declaration that they were not bound to take over the goods referred to, together with damages for breach of implied warranty.

After statements by counsel—Mr. Clayton, K.C., for the plaintiffs and Mr. Tomlin, K.C., for the defendants—the hearing was adjourned.

## Tariff Changes

**GAMBIA.**—The import duty on Kola nuts has been increased from 3d. to 4d. per lb.

**ITALY.**—Certain essential oils and essences, terpeneless oils and essences, synthetic perfumes and constituents of essences not specified in the tariff, and alkaloids and their salts not specified are dutiable at the rate of 15 per cent. of their official valuation. Revised valuations effective from January 1 were published in the Board of Trade Journal of January 11 (p. 44).

## Contracts Open

*Tenders are invited for the following articles. The latest dates for receiving tenders are, when available, given in parentheses:*

**FRANCE.**—Raw coal tar in large quantities. Particulars from Department of Overseas Trade, 35, Old Queen Street, London. Reference No. 18106/F.W./00(2).

**LONDON** (January 29).—Pitch, creosote, oil, tar, Portland cement, lime. Particulars from J. P. Waddington, Town Hall, Marylebone Road, London, N.W.1.

**CAIRO** (February 7).—Acids, greases, paints, oils. Particulars from Department of Overseas Trade (Room 84), 35, Old Queen Street, London. Reference No. 9,777/F.E./GP.

**WATFORD** (February 1).—Distilled tar. Particulars from D. Waterhouse, Municipal Offices, High Street, Watford.

**BRADFORD** (January 24).—Filterpress cloths (20,000). Particulars from Engineer's Office, Esholt Hall, Apperley Bridge.

## Marketing of German Potash

THE Deutsches Kalisyndikat G.M.B.H., of Berlin, states the New York correspondent of the *Times*, has organised a potash importing syndicate there to handle its products in the United States, Canada, Cuba, and Porto Rico. It is understood that the syndicate will commence operations on May 1 next. The report also states that Mr. Robert Dollar, of the Dollar Steamship lines, will provide steamship facilities for imports, which are expected to reach 300,000 tons annually, and that ample banking support is promised for financing the arrangements. It is understood in New York that the purpose of establishing this new connection is to evade reparations, lessen taxation, and get away from the fluctuating mark and put the business on an American dollar basis. The potash importing syndicate will be largely owned by the German company, which, it is believed, will sell the potash at cost, banking the proceeds in America in dollars.

# THE BRITISH ALIZARINE COMPANY LTD.

**Manchester****London****Glasgow**

## Manufacturers of Alizarine Dyestuffs

**ALIZARINE RED**  
(all shades)**ALIZARINE BORDEAUX****ALIZARINE GREEN**  
(soluble and insoluble)**ALIZARINE RED S. POWDER****ALIZARINE (MADDER) LAKES**  
(of all qualities)**ALIZUROL GREEN**  
(Viridine)**ALIZANTHRENE BLUE****ALIZARINE BLUES**  
(soluble and insoluble)**ALIZARINE CYANINE****ALIZARINE ORANGE****ALIZARINE BLUE BLACK****ALIZARINE MAROON****ANTHRACENE BROWN****ALIZANTHRENE BROWN****ALIZANTHRENE YELLOW**

Other fast colours of this series in course of preparation

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**CHROME TANNING** and other **Chrome Compounds****TELEPHONES**  
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500 **EAST LONDON**  
2067 **DOUGLAS, GLASGOW****TELEGRAMS:**  
**BRITALIZ MANCHESTER**  
**BRITALIZ LONDON**  
**BRITALIZ GLASGOW**

All communications should be  
addressed to

**The British Alizarine Co., Ltd.**  
**Trafford Park, Manchester**



## Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

### County Court Judgments

[NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.]

CARDNO, John Alexander, 93, Bruce Grove, Tottenham, chemist. (C.C., 20/1/23.) £15 8s. November 24.  
CHALMERS, Mr. E. M., c/o, 5, Cherry Road, Chester, chemist. (C.C., 20/1/23.) £21 5s. 8d. November 29.  
EDWARDS, J. M., 311, Fulham Palace Road, S.W., chemist. (C.C., 20/1/23.) £10 9s. November 22.  
GATTY SAUNT AND CO., 36/8, Victoria Street, S.W., chemical merchants. (C.C., 20/1/23.) £32 7s. 9d. November 29.  
HOOKE, George Edmund, 86, Gray's Inn Road, W.C., chemical merchant. (C.C., 20/1/23.) £50 3s. 9d. November 13.  
LEIGHTON LABORATORIES, LTD., 9/10, Pancras Lane, Queen Street, E.C., chemists. (C.C., 20/1/23.) £42 7s. 6d. November 24.  
LINGS DRUG STORES, 205, High Street, Acton, chemists. (C.C., 20/1/23.) £17 7s. 4d. November 3.  
NASMYTH, John Cyril, Old Market Street, Bristol, chemist. (C.C., 20/1/23.) £22 17s. 4d. November 24.

### Bill of Sale

KENDREW, Walter, Trafford Road, Eccles, chemist. (B.S., 20/1/23.) January 10. £54.

### Receivership

SAPON SOAPS, LTD. (R., 20/1/23.) C. F. M. Gibbons, of Chelsea Street, Nottingham, was appointed receiver on December 30, 1922, under powers contained in debentures dated April 6 and September 28, 1921.

### Mortgages and Charges

[NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges. The following Mortgages and Charges have been so registered. In each case the total debt, as specified in the last available Annual Summary, is also given—marked with an \*—followed by the date of the Summary, but such total may have been reduced.]

ALCOCK (E. W.) AND CO., LTD., Warwick, oil manufacturers. (M., 20/1/23.) Registered January 3, £1,000 debenture, to N. B. Davis, 10, Dyers Buildings, Holborn, E.C., oil merchant; general charge.  
LONDON DYE MANUFACTURING CO., LTD. (M., 20/1/23.) Registered January 2, £5,000 debenture, to Chas. Page and Co., Ltd., 47-51, King William Street, E.C., chemical merchants; general charge. \*—, June 13, 1922.  
LOUBET AND CO., LTD., London, E.C., soap manufacturers. (M., 20/1/23.) Registered January 4, £10,000 debentures and £5,000 2nd debentures; general charge. \*Nil. September 13, 1921.  
SNELLING AND SONS, LTD., Norwich, tallow refiners. (M., 20/1/23.) Registered January 1, £33,000 debentures (secured by Trust Deed, dated December 21, 1922), present issue £23,000; charged on various premises at Norwich, also general charge. \*Nil. November 9, 1922.

### Satisfaction

BLEACHERS ASSOCIATION, LTD., Manchester. (M.S., 20/1/23.) Satisfaction registered January 9, £60,000, registered December 2, 1912.

## London Gazette

### Company Winding-Up Voluntarily

CHEMICALS AND BY-PRODUCTS, LTD. (C.W.U.V., 20/1/23.) H. G. Howitt, of W. B. Peat and Co., Chartered Accountants, 11, Ironmonger Lane, London, appointed liquidator. Meeting of creditors at Winchester House, Old Broad Street, London, Tuesday, January 30, at 11 a.m.

### Notice of Intended Dividend

HIRCHBERG, Leon Maurice, 20, Birchington Road, Stroud Green, and Ely Place, London, consulting chemist. Last day for receiving proofs, January 30. Trustee, P. S. Booth, 28, Kimberley House, Holborn Viaduct, City of London.

### Bankruptcy Information

ROWLEY, Albert James, 36, Heathfield Gardens, Chiswick, lately carrying on business at Crown Works, Brentford, Middlesex, paint and varnish manufacturer. First meeting, January 19, 12 noon, 29, Russell Square, London, W.C.1. Public examination, February 27, 11 a.m., Court House, Half Acre, Brentford.

### New Companies Registered

KABBUR AND CO., LTD. Chemical, dye and colour manufacturers, dyersalters, etc. Nominal capital, £500 in £1 shares. A subscriber: K. H. Kabbur, Kamala House, Old Hall Road, Broughton Park, Manchester.  
THE MINERALS SEPARATION AND POWELL DUFFRYN COAL TREATMENT AND BRIQUETTING CO., LTD., 62, London Wall, E.C. Manufacturers of and dealers in chemicals, manures and all by-products of coal; distillers, etc. Nominal capital, £10,000 in £1 shares (5,000 "A" and 5,000 "B").  
A. WANDER, LTD., 45, Cowcross Street, London, E.C. Chemists, druggists and analytical chemists; manufacturers of and dealers in oils, fats, soap, etc. Nominal capital, £500,000 in £1 shares.

### Potash Fertilisers

In a lecture on the above subject to the members of the Rochester Branch of the Kent Farmers' Union, on January 16, Mr. G. A. Cowie said that if the policy of aiming at the highest possible crop yields in order to combat low prices were adopted by farmers, in accordance with the advice of a large body of expert opinion, the use of potash fertilisers would assume a relatively more important position. It was under conditions of high farming that potash was most required. While it might be feasible for small crops under many conditions to fulfil their relatively smaller need for potash out of the soil's reserves, it was not possible under average conditions to satisfy the potash requirements of large crops, and especially potash-loving crops like potatoes, clover, and mangolds, except by giving supplementary dressings. Another important effect of potash, which was needed more in cases of intensive cultivation, was the strengthening of the crop's constitution and increasing its resistance against disease and unfavourable climatic and other conditions.

### London Soap Workers Dispute

THE strike at the soap works of J. C. and J. Field, Ltd., of Lambeth, London, was considered last week end at a conference of the Soap and Candle Trades Employers' Federation, when it was decided to inform the National Union of Distributive and Allied Workers that the Federation was prepared to discuss the matter at the Joint Industrial Council in a constitutional manner when the workers on strike at Messrs. Field's had returned to their employment. On Thursday a representative of THE CHEMICAL AGE was informed by an official of the Union that Mr. Boyd, London secretary, had had an interview with Messrs. Field during the week and had left on Thursday for Warrington to discuss the matter with the Chairman and Secretary of the Employers' Federation.

### Spraying of Metallic Lead

A SUBSCRIBER TO THE CHEMICAL AGE is anxious to obtain the name of the makers of a small apparatus for spraying metallic lead on to steel and other metal surfaces.

